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THE

**JOURNAL**

OF

**THE ASIATIC SOCIETY**

OF

**BENGAL.**

—

**VOL. I.**

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THE
JOURNAL
OF
THE ASIATIC SOCIETY
OF
✓
BENGAL.



EDITED BY
JAMES PRINSEP, F. R. S.
SECRETARY OF THE PHYSICAL CLASS, ASIATIC SOCIETY.

VOL. I.

JANUARY TO DECEMBER,
1832.

"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta; it will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease."

SIR WM. JONES.

Calcutta :

PRINTED AT THE BAPTIST MISSION PRESS, CIRCULAR ROAD.

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1832.



TO
CAPTAIN JAMES D. HERBERT,
Bengal Infantry,

LATE

DEPUTY SURVEYOR GENERAL OF BENGAL, AND SUPERINTENDENT
OF REVENUE SURVEYS;

AT PRESENT HOLDING THE APPOINTMENT OF
ASTRONOMER TO HIS MAJESTY

The King of Oude:

WHOSE JUDGMENT ORIGINATED; WHOSE PERSEVERANCE AND EXERTIONS SUCCESSFULLY
ESTABLISHED; AND WHOSE SUPERIOR ABILITIES SUPPORTED FOR 3 YEARS,

THE FIRST JOURNAL

IN INDIA

DEVOTED TO THE EXCLUSIVE PUBLICATION

OF

GLEANINGS IN SCIENCE;

THIS VOLUME,

IN ALL RESPECTS, BUT TITLE, A CONTINUATION OF HIS OWN WORK,

IS

Inscribed,

BY HIS ATTACHED FRIEND,

THE EDITOR.

CALCUTTA, }
January 1, 1833. }



PREFACE.



THE ASIATIC SOCIETY, on the 7th March, 1832*, passed a resolution, that the monthly journal hitherto published under the name of "GLEANINGS IN SCIENCE," should be permitted to assume that of JOURNAL OF THE ASIATIC SOCIETY, and to continue it as long as the publication remains under the charge of one or both of the Secretaries of the Society. This privilege has, as it was anticipated, been the means of extending very considerably its circulation, while it has given a character and authenticity to the work, by its connection with an institution of established literary reputation, which no anonymous magazine, however well conducted, could hope to command.

The advantages of extended circulation have reacted to the benefit of subscribers, by enabling the Editor to increase the quantity of letter press from 400 to nearly 600 pages; and yet so constant has been the growing support of its contributors, that the pages of THE JOURNAL have been devoted, with few exceptions, to the insertion of original communications.

To many readers it would doubtless have been preferable that THE JOURNAL should contain more copious extracts from English scientific periodicals, which are not procurable in the interior of India; but conceding that, as an organ of Indian scientific intelligence, it must obviously derive its only merit among the many similar periodicals of the present day, from its stores of *oriental* literary and physical research, it will be generally acknowledged, that the first object of the work should be to give publicity to such oriental matter as the antiquarian, the linguist, the traveller, and the naturalist may glean, in the ample field open to their industry in this part of the world. While acting

* The January number was not published until the middle of March.— Since then exertions have been made to bring up arrears, and in future each monthly number will appear with regularity on the 10th of the following month; the insertion of the meteorological register rendering an earlier issue impossible.

on this principle, however, the Editor has not lost sight of the great utility of following, as far as means would permit, the progress of the various sciences at home, especially such as are connected in any way with Asia; the only limits thereto being want of space, and want of time to peruse and extract from the vast number of publications of the present day. Want of room also precluded the possibility of republishing the proceedings of the Medical and of the Horticultural Societies; but this had become less urgent since both of those useful bodies adopted the excellent rule of giving early publicity to their own proceedings and records.

To the Asiatic Society THE JOURNAL has naturally looked for its most frequent and interesting communications; and in consequence of its more intimate connection with that Institution, the proceedings of that body have been given in greater detail than heretofore, so that absent members may learn exactly what passes at its meetings, and what accessions are made from time to time to its library and its museum. Many absent members have complained of the quarterly subscriptions they were heretofore called upon to pay, while they remained in ignorance of what was going forward; this source of objection is now obviated, and perhaps a still greater amendment may yet be effected for their benefit, by an arrangement that all members of the Society shall receive a copy of the Journal gratis, which will reduce their annual payments nearly one fourth.

It is unnecessary to recapitulate the contents of the present volume, or to allude in anonymous praise to those who have favored its pages with their assistance; since the authors have, in most cases, on suggestion, permitted their writings to be authenticated by the insertion of their names, as should always be the case in matters of fact, observation, and research. One illustrious name however must not be passed over without a tribute of gratitude for its valued and frequent contributions, a tribute more sincerely paid, since India has now lost the power and the claim to their continuance; she has resigned her most eminent oriental scholar to climes where his talents may find more genial appreciation, but where they cannot excite more respect or admiration, than they will ever command in the land which called forth their energies and directed their application.

The learned Societies at home will be proud to publish the continuation of the *Analyses of the Puránas*, of which the four first have appeared in these pages. Abstracts of four only were ready for the press, but translations of the remainder of the eighteen *Puránas* themselves had been completed under the superintendence of Professor Wilson, before he quitted India.

Mr. Alexander Csoma's indefatigable labour, in opening to us a first acquaintance with the literature of Tibet, will be estimated as it deserves by literary men—a contracted circle perhaps, because deep erudition and study are requisite to form critics capable of appreciating the nature and bearing of his peculiar researches upon the history, languages, and religions of other nations, both ancient and modern. All may however feel sensible of the devotion, zeal, and perseverance, which are necessary to lead a man, alone and unpaid, into a distant and wild country, to learn its language, and study its people at the fountain head. The volumes of notes which Mr. Csoma has presented to the Asiatic Society, will, it is hoped, be published in their Researches at length.

In furtherance of the desire of the Government, the greater part of Dr. Buchanan's Statistics of Dinajpúr has been printed in a detached form, as commenced by the Editor of the *GLEANINGS*; and to complete the work more speedily, two extra numbers have been issued in the course of the year. It will be remarked, that there are many plates referred to in the text: the drawings alluded to are in possession of the Honorable Court of Directors, along with the original manuscripts; it was thought better to preserve the references, in case the Hon'ble Court might hereafter be persuaded to publish them, either in a separate form, or of a size adapted to the present edition. It must not be forgotten, that it is this undertaking which gained to the *GLEANINGS* the valuable privilege of free postage through the Bengal Presidency. The Editor is happy to announce, that the same boon has, in the most liberal manner, and without any solicitation, been extended to the Presidency of Bombay and to the Government of Ceylon, by their enlightened Governors, His Excellency the Earl of CLARE, and the Right Honorable Sir R. W. HORTON, to whom his thanks are thus publicly and respectfully addressed.

To his numerous correspondents, the Editor can but proffer thanks for past, and solicitations for future, support, bidding them remember that, the scope and object of this publication embraces the literature, the manners, the geography, physical and mineral, the arts, the natural productions of Asia, the phenomena of its climate, and observations of the heavens. In the words of the illustrious founder of the Asiatic Society, “ the bounds of its investigation will be the geographical limits of Asia ; and within these limits its inquiries will be extended to whatever is performed by man or produced by nature.”

Dedicated, by permission, to

LADY W. C. BENTINCK,

A

TREATISE

ON

THE MUSIC OF HINDOOSTAN,

COMPRISING A DETAIL OF

THE ANCIENT THEORY

AND

MODERN PRACTICE.

THE similarity of the music of Egypt and Greece to that of this country has been traced and pointed out : harmony and melody have been compared : and time noticed. The varieties of song have been enumerated, and the character of each detailed : a brief account of the principal Musicians superadded, and the work concluded with a short alphabetical glossary of the most useful musical *Terms*.

BY

CAPTAIN N. WILLARD,

Commanding in the Service of H. H. the Nuwab of Banda.

Price to Subscribers, Sa. Rs. 8.

PROSPECTUS.

A TREATISE on the Music of Hindoostan was much wanted. The scanty information obtainable through the channels of Dr. GILCHRIST and Sir WILLIAM JONES, are neither of themselves sufficient to fill this chasm, nor do they elicit light sufficient to enable one to grope through the various obscure writings in the vernacular languages and dialects. The songs set to music by Mr. BIRD and Mr. WALKIER, are of the more modern style, and not of the ancient school; so that, instead of elucidating the theory, they lead us into confusion, when compared with the tables of Rags and Raginees given by Sir W. JONES.

The forthcoming work has been written with the view of describing in some measure, the theory and practice of the original music of Hindoostan, but chiefly to unfold the beauties of which it is susceptible. The extravagant eulogium offered to the music of ancient Greece, and the striking similarity which appeared to the author to exist between that and the subject to be treated of in this work, has led him to point them out, in the hope that, should a taste for the music of this country obtain among the professors of the science in Europe, it might perhaps conduce to the elucidation and revival of a much-desired and lost branch of knowledge, namely, the music of ancient Egypt and Greece.

For this purpose it appeared to the author, that a bare translation of any of the existing native works would not suffice. All who have been taught music are so much accustomed to the European way of explaining it, that every other must necessarily appear uncouth and preposterous. In the arrangement of this work, therefore, the European system has been adopted.

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HINDOOSTANEE MUSIC. What it is termed in the original. The treatises held in the greatest estimation. Native divisions what, and how many. The arrangement adopted in this work.

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OF HARMONY AND MELODY. The origin of harmony in Europe. Opinions of several learned men on the subject of harmony, with that of the author. Claims of melody.

OF ORIENTAL MELODY. Not generally susceptible of harmony. Limited to a certain number. Its character.

OF RAGS AND RAGINEES. The general acceptation of the terms supposed to be incorrect. Reasons offered, why they are limited to season and time. Of the Rāgmala. Absurdity of limiting tunes to seasons. Divisions of Rags and Raginees into classes. Rules for determining the names of the mixed Raginees. Table of compounded Rags. The Rāgmala copiously described.

OF MUSICAL INSTRUMENTS. Their present state susceptible of much improvement. Their classification. Detailed description of the several instruments now in use.

Of the various species of VOCAL COMPOSITIONS OF HINDOOSTAN. Twenty different species described.

Of the PECULIARITIES OF MANNERS and CUSTOMS in HINDOOSTAN, to which allusions are made in their song. Its characteristic nature. Reasons assigned for several of them, which now no longer exist, and examples produced.

Brief account of the most celebrated MUSICIANS of HINDOOSTAN.

GLOSSARY of the most useful musical terms.

N. B. *The work will be printed on superior English paper, at the Baptist Mission Press, Calcutta.*

Subscriptions will be received by Mr. A. JEWELL, Moorghehuttah, and Messrs. THACKER and Co. St. Andrew's Library.

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ERRATA.

- Page 10 line 9 for "wool," read "wood."
 — 11 — 7 from bottom, for "plate 1, fig. 2," read "plate 2, fig. 1."
 — 14 — last line, for "delomite," read "dolomite."
 — 19 — 16 from bottom, for "3, 4, 5," read "1, 2, 3, 4."
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AND

In Fig 2, plate II. continue the dotted arc $l'l a''$ to a' .

The line $A c'$ continue to c .

- 28 — 7 from top, for "manima," read "minima."
 — — at bottom, for "Artesien," read "Artesian."
 — 33 — 7 for "January," read "February."
 — 410 — — in last column of Table II. for "2m. 58s. 8," read "0m. 58s. 8."
 — 46 — 18 from top, after "which" insert "comma."
 — — — "either" ditto.
 — 47 — 2 from top, for "have," read "has."
 — 57 — 12 for " $99\frac{1}{4} 99\frac{1}{2} 99\frac{3}{4}$," read " $99^1 99^2 99^3$."
 — 59 — 24 and throughout the article, for "sack," read "sac."
 — 60 — 4 "orbital," read "orbital."
 — — 10 "interval," read "internal."
 — — 29 "lips," read "tips."
 — — 34 dele "by."
 — 60 — 15 for "compressed and hard; before," read "compressed and hard before ;"
 — — 28 for "lips," read "tips."
 — 62 — 11 for "this Chiru," read "the Chiru."
 — 63 — 10 for "bambdoidal," read "lambdoidal."
 — — 14 for "malars," read "molars."
 — 65 — 8 for " $1\frac{1}{8}$," read " $\frac{1}{8}$."
 — 67 — 2 from bottom, after "than," read "the."
 — 74 — 15 for "9°," read "9'."
 — 75 — 21 dele "rufous," repeated.
 — 79 — 17 from bottom, for "done," read "donc."
 — 148 — — foot note, for "Rutboo," read "Kubboo."
 — 226 1st par. 5th line for "Ekadautashtra," read "Ekadanslitra,"
 — 226 4th „ 4th — for "Kridama," read "Srid'ama"
 — 229 2nd „ 5th — for "Vrishapati," read "Vrihaspati."
 — 231 — „ 3rd — for "Viswaséna" read "Viswakarma."
 — 238 — „ after "Ganges river," insert "at Gházipur."
 — 245 10 „ from bottom, for "it," read "the mirror."
 — — 1st „ 7th — for "He having," read "Having."
 — 296 line 3 for "but mostly," read "and,—"
 — — 7 for "hydrogen. When," read "hydrogen, where."
 — 305 — 20 for "circumference," read "diameter."
 — — 21 for " $27\frac{1}{2}$ rupees," read " $2\frac{1}{2}$ rupees."

Errata in Meteorological Register, for June.

Date	Hour.	Bar.
13	Sun-rise, for	,365 read ,465
14	"	,399 ,499
22	"	,517 ,617

Add 0,010 to all the figures in the Barometrical column for 10½ P. M.

- 340 — 6 after "*Rhinolphus*," insert "and two species of *Vespertilio*."
- 355 — 13 for "*ακανσα*," read "*ακανστα*."
- 355 — 2 from bottom, after "*nilam*," insert "*nil mani*, (or *manik*.)"
- 356 — after "College of Fort William," insert "the word *bahrmani* is also used in the *Khawás-ul-ir*, as a variety of the *yaqút*."
- 358 — 20 dele "or a species of garnet."
- 358 — 22 for "*manik*," read *lálri*."
- 403 — 5 from bottom, for "*ΔΙΟΚΑΠ*," read "*ΔΙΟΚΑΗ*."
- 404 — 14 for *OVA*," read "*ΟΤΑ*."
- 411 — 8 for "Latitude 25° 43'," read "Lat. 25° 47' 26'."

In Table IV. of the Estimate of Life in India, page 284, the first four figures in the second and third column should stand thus :

Age.	Survivors.	Deaths.
20	52221	473
21	51748	489
22	51259	522
23	50737	557

The mistake arose from the calculations having originally been made to commence with the age of nineteen, instead of twenty: and the 5 year averages in Table III. page 283, will all be slightly affected by the same cause. The last figure in the second column, page 284, should be reversed; and in the last column but one, for "2080," read "2008."

- Line 414 liue 3 from below, for "*molluscæ*," read "*mollusca*."
- 444 — 36 after "ministry," insert "of a man."
- 445 — 3 from below, for "2125," read "212.5."
- 446 — 7 for "in bullion," read "bullion."
- 447 — 21 for "will be," read "would be."
- — — after "at any," insert "rate."
- 480 — 15-16 for "*Tariqa-i-Chishita*," read "*Tariqa-i-Chishtia*."
- 483 — 36 for "lost about," read "tost about."
- — — 39 for "*Mújtahid-i-mústaqill*," read "*Mújtahid-i-mústaqill*."
- 485 — 20 for "*Taqwiat-ul-Imám*," read "*Taqwiat-ul-Imán*."
- 487 — 15 erase "5" at beginning of line.
- 488 — 7 for "differences," read "difference."
- 489 — 20 for "*Káfr*," read "*Kufr*."
- 491 — 23-24 for "*Isbrák f'il Tasarruf*," read "*Isbrák f'il Tasarruf*."
- 492 — 10-11 for "the authority or influence of Saints, as respecting intercessors," read "respecting the authority or influence of Saints as intercessors."
- 498 — 23 for "*Khátim*," read "*Khátima*."
- 501 — 12 after "*A B C*," insert "[fig. 5.]"
- 505 — 20 for "5 53 59," read "5 52 59."
- 506 — 11 "5 53 10," read "5 53 27."

JOURNAL

OF

THE ASIATIC SOCIETY.

No. 4.—April, 1832.

I.—*Geographical Notice of Tibet.* By Mr. Alexander Csoma de Körös.

The vast mountainous tract of country between about 73° and 98° east longitude from London, and 27° and 38° north latitude, may be called by the general name of "Tibet," since the Tibetan language is understood every where from Belistan (or Little Tibet) down to the frontier of China, although there be several corrupt dialects of it, and the inhabitants of these countries, in general, have the same manners and customs, are addicted to the same faith, (to Buddhism,) and have the same religious books written or printed in characters common to all the different provinces.

The native name of Tibet is "*Pot*," as it is pronounced commonly ; "*Bod*," more properly. It denotes both the nation, and the country : for distinction's sake the country is expressed by "*Bod-yul*" (Bod-land), a male native "*Bod-pa*," and a female one "*Bod-mo*." The Indian name for Tibet is *Bhot*.

The natives of Tibet apply the name *Pot*, or *Bod*, especially to the middle Tibet, or to the two provinces "*U*" and "*Tsang*" (*Dvus-Qtsang*, pronounced *U-tsáng*), the capitals of which are *Lhasa* and *Zhikátsé*. Hence a native of those two provinces is called by them especially *Pot-pa*. The eastern part of Tibet is called "*K'ham*" or "*K'ham-yul*," also "Great Tibet." The north-western part towards Ladak is called "*Nári*." Bhutan is called by several names by the Tibetans ; as, "*Lhopato*," "*Lho-mon-k'ha-zhi*," "*Lhobruk-pé-yul*," or simply "*Lho*," (the south.) According to these divisions, the inhabitants of Tibet are distinguished thus : "*Pot-pa*"

(or *U-tsang-pa*), means a native of middle Tibet; "*K'ham-pa*" (or *K'ham-ba*), one of eastern Tibet; "*Náripa*," one of western Tibet; and "*Lho-pa*," a native of Bhutan.

The whole of Tibet occupies high ground, and lies among snowy mountains. Hence it is called in Tibetan books, by several poetical names, expressive of snow, ice, or frozen snow, cold, and high elevation. The highest ground in Tibet is in *Nári*, especially the peak called *Tísé* or *Tésé*, in Tibetan, and *Kailasa* in Sanscrit, about 80° E. longitude, and 34° North latitude. The sources of the Indus, Setledge, Gogra, and the Brahmaputra rivers are in *Nári* (*Mñahris*). There are several large lakes also. Tibetan writers, in describing the situation of Tibet, have likened *Nári* to a lake or watering pond; *U-tsang* to four channels; and *K'ham-yul* to a field.

Tibet is bounded on the north by the countries of the Turks and Mongols, whom the Tibetans call *Hor*, and *Sok-po* (*Hor-sok*). On the east by China, (*Gyanak* in Tib.) On the south by India, (*Gyagar* in Tib.) On the west by India, Cashmir, Afganistan, *Tazik-yul*, and Turkistan.

The hill people of India, who dwell next to the Tibetans, are called by them by the general name "*Mou*," their country *Mon-yul*, a man *Mou-pa* or simply *Mon*, a female *Mon-uo*.

From the first range of the Himalaya mountains on the Indian side to the plains of Tartary, the Tibetans count six chains of mountains running in a north-western and south-eastern direction, when viewed from Kangri in *Nári* (a lofty mountain running from south-west to north-west), whence the ground commences to take on one side a north-western and on the other side a south-eastern inclination. In the spacious valley, which is between the third and fourth range of the before mentioned mountains, is the great road of communication between *Ladak* and *U-tsaug*. The principal countries or districts in this direction, from north-west, are as follows: *Beltistan* or Little Tibet, *Ladak*, *Teshigaug*, *Gár* or *Gáro* (the lower and upper), *Troshot*, *Tsáng*, *U*, *Bhrigang*. It is here likewise, that the two principal rivers, the *Sengé k'há-bab*, and the *Tsánpo* take their course; that by *Ladak* to the north-west, and may be taken for the principal branch of the Indus; this to the south-east, and forms afterwards the Brahmaputra.

The countries on the Indian side that lie next to Tibet, commencing from Cashmir, are as follows: "*K'ha-ch'hé-yul*" (or *K'ha-ch'hul*), Cashmir; *Varan*, *Mandé*, *Palder* or *Chatirgerh*, *Pángé*, *Gár-zha* or *Lahul*, *Nyungti* or *Kullu*; *K'hunu* or *Knaor*, and *Bésahr*; *Kyonam*

and *Shák'hok*, or Garhwal and Kamaon ; *Dsumlang* ; *Gorkha-yul* ; *Pal-yul* (*Bal-yul*) or Népal ; *Lhopato* or Bhutan ; *Ashong* or Asam.

The names of the countries or districts in Tibet that lie next to India, commencing from Cashmir, are as follows : *Himbab* (near to Cashmir), *Purík*, *Zanskar*, *Spiti*, *Gugé*, *Purang*, *Kyirong*, *Lhoprák*, *Myánam*, *Lach'hi*, *Mon-ts'ho-sna*.

Beyond the fourth range of the Himalaya mountains, or in the next valley to the north of Ladak, there are the following districts, counting them eastward : *Nubra*, *Rudok*, *Tso-tso*, *Bombá*, *Chang-ts'ha-k'há*, *Chang-ra greng*.

The three great divisions of Tibet are :

1. Tibet Proper, or *U-tsáng*. 2. *K'ham-yul*, or the eastern part of Tibet, and 3. *Nári*, or the north-western part of Tibet.

I. Tibet Proper or *U-tsáng*. It is that part of Tibet which lies next to the north of Asam, Bhutan, and Nepal, that is called by this name. This is the most considerable part of Tibet. The inhabitants of this division are the most industrious, skilful, and polite of all the Tibetan races. The number of the inhabitants in these two provinces is said to be about one hundred and thirty thousand families. *Lhasa* is the capital of the province *U*, as also of the whole of Tibet. From the seventh till the tenth century it has been the residence of the kings of Tibet. Now it is the first place for commerce in Tibet, the seat of government, and the residence of the Chinese *Ambans* (or ministers). There are several religious establishments. Near *Lhasa* is *Potala*, the residence of the great Lámá, (styled *Gyel-vá-rin-po-ch'hé*,) the head of the sect called *Géluk-pa* or *Geldanpa*. Other remarkable places, in the province *U*, are : *Yam-bu-Lhá-gáng*, a fort or castle built in the fourth century, by *Thothori*, a king. It has been the residence of the ancient kings. It contains some antiquities, and plastic images of the ancient kings. It is a few days' journey to the south from *Lhasa*. *Sam-yé* (*Bsam-yas*) a royal residence and a large monastery, one day's journey from *Lhasa*, built in the eighth century by *K'hri-srong-déhu-tsan*, a celebrated king. There are deposited several ancient books taken from India. In the province of *U*, among other forts or castles, *Dé-ch'hén-song* and *Haspori* are the most considerable. In the province of *Tsang*, the following ones are of some repute : *Chang-nam-ring*, *Chang-Lha-tsé*, *Phun-ts'hok-ling*, and *Gyang-tsé*.

2. *K'ham-yul* (*K'hams-yul*), called also *Pot-ch'hén*, or Great Tibet, consists of the eastern part of Tibet, and is bounded

by China on the east. There are several small principalities; as, *K'ham-bo*, *Gábá*, *Li-thang*, *Dé-gé* (or *Der-ghé*), *Brag-yak*, *Dép-ma*, *Go-jo*, *Gya-mo-rong*, *Jang-sa-tam*, *Amdo*, *K'hyamdo*, &c. The people of these parts differ very much from the rest of the Tibetans in their stature, features, dress, customs, and in the manner of speaking the Tibetan language. They are very robust, passionate, void of artifice or cunning, not fond of ornaments on their dress. In *K'ham-yul*, those called *Pon* or *Bon*, holding still the ancient religion of Tibet, are very numerous. They have also their literature, religious order, several monasteries, and kill several animals, great and small cattle, for sacrifice: they have many superstitious rites.

3. The north-western part of Tibet, from *Tsang* to *Ladak*, is called *Ñári*. This part is of very great extent, but the number of inhabitants is inconsiderable, not exceeding fifty thousand families together with *Ladak* and *Beltistan*. There have been several small principalities formerly in *Ñári*, as, *Gugé*, *Puráng*, *Kangri*; but all these belong now to the great *Lámá* at *Lhassa*, and are governed by *K'harpons* (commanders of forts) sent from *Lhassa*. There are also in *Ñári* very extensive deserts. The inhabitants dwell in tents, made of hair cloth; exercise a pastoral life, without any agriculture. Their number is said to amount to ten thousand families, and they all are under the *sGar-pon* or chief officer residing at *sGár* or *sGáro*, who is sent from *U-tsang* or *Lhassa*, and generally remains there for three years.

Gugé, part of *Ñári*, lying to the north of *Garhwal* and *Kamáon*, consists of two valleys, inhabited by somewhat more than two thousand families. The principal places are *Tsaprang* and *Tholing*, not far from each other. The first is the residence of the commanding officer called the *Kh'arpon* of *Tsaprang*, and the second is a large monastery and the seat of a *Lámá* styled the *K'hanpo* of *Tholing*. He resides during the summer at *Teshigang*, another large monastery, a few days' journey to the north from *Tholing*. These two places, (*Tsaprang* and *Tholing*) have been the residence of the princes that have reigned there from the 10th till the end of the 17th century.

Ladak, formerly called *Mar-yul*, still has its own prince, but he must accommodate himself to the political views of the Chinese. *Zanskar*, *Purik*, *Ñubra*, form part of the *Ladak* principality. In the whole of *Ladak* the number of the inhabitants does not exceed twenty thousand families. Nearly the half of them are Mohammedans, mostly of the Shia persuasion. *Lé* (*slé*) is the capital of *Ladak*, the residence of the prince, and the emporium of a considerable trade with *Turkistan*, *Lhassa*, and the *Panjáb* countries. It is about 15 to 20

days' journey from Cashmír to the east, and nearly under the same latitude, (i. e. 34° north lat.)

Little Tibet or Beltistan (*Belti-yul*, in Tibetan), is the most north-western part of Tibet. There are several chiefs. The chief residing at *Kárdo* is the most powerful among them; those of *Kyeré* and *Kuru*, with some others, depend on the former. The chief of *Shigár* holds sometimes with the prince of Ladak and sometimes with the chief of *Kárdo*. The chiefs of *Minaro*, *Hasora*, &c. are the heads of some predatory tribes. In the several defiles to the south, in the neighbourhood of Beltistan, there live some predatory tribes, among whom the most notorious are the *Dárdu* people. These barbarous tribes are either of Afghán or Hindú origin. The inhabitants of Beltistan are Mahomedans of the Shia persuasion. They speak a dialect of the Tibetan language, but have nothing of the Tibetan literature. They keep some books or fragments in Persian. The correspondence from Ladak with the chiefs of those parts, is carried on in Persian, as also with Cashmír. The people of Beltistan are very unhappy on account of their chiefs having continual quarrels with each other, or with the prince of Ladak. The climate is warm. In the lower part of Beltistan, snow never falls. The soil is good. There are several kinds of grain; they have two crops. There are likewise several sorts of excellent fruits; as, of apples, pears, peaches, plums, figs, grapes, mulberries, &c. &c. There is a great want of salt and wool in those parts; formerly there existed a commercial route from Cashmír to Yarkand through Beltistan, (of 30 days' journey;) but that country being in an unsettled state, the Cashmírian merchants afterwards preferred that through *Lé*, in Ladak, although it is very circuitous.

The people of *Lhopátó* or Bhutan, on account of their language, religion, and political connexion, belong to Tibet. But in their customs and manners they have adopted much from the Indians. They are more clean in their dresses and houses than the other Tibetan races. The men are of a martial spirit, like those of *K'ham-yul*, with whom they are said to have much resemblance in their character. The people of Bhutan speak a corrupt dialect of the Tibetan language; but there are several religious establishments, a great many books, and some religious persons are well acquainted with the Tibetan language and literature. They are Buddhists of the sect called in Tibet *Brükpa* (vulg. *Dukpa*.) They adopted this kind of Buddhism in the 17th century of our æra, when *Nák-Váng Nam-gyel*, a Lámá of great respectability, leaving *Tsáng* in middle Tibet, established himself in

Bhutan. There are counted now about forty thousand families. The whole province of Bhutan consists of four districts or valleys, which if counted from east to west, are as follows: *Thet-yul*, *Thim-yul*, *Patro* or *Pato*, and the middle district. The principal place is *Teshi-ch'hos-dsong*.

LAKES.—There are four principal lakes in Tibet. The *Ma-pham yu-ts'ho* (Mansarovara), in *Nári*, is the most considerable, of a circumference of about one and a half day's journey. In *U-ts'ang*, the *Yarbrokyu-ts'ho*, *Mu-le-sgrum ts'ho*, and *Nam-ts'ho ch'hukmo* are likewise of great extent. There are many others of inferior rank or less compass; as, that of *Lá-nág* to the west of *Ma-p'ham*. From *Rúdok* (near Ladak) to the east or south-east, there are many salt lakes.

MEDICINAL OR MINERAL WATERS.—Between *U* and *Ts'ang* there are some hot springs, used in curing cutaneous diseases and the gout. But such hot springs are numerous in the mountains lying east from the *Ma-p'ham* lake; especially at one place there is a hole out of which continually issues vapor, and at certain intervals, hot water is ejected with great noise to the height of 12 feet.

GLACIERS.—The summits of many of the Tibetan mountains remain through the whole year covered with snow. But there are especially four glaciers or mountains covered with ice or frozen snow; as, *Tisé*, *Huwo*, *Shámpo*, and *Pulé*.

MINES.—Mines are rarely excavated in Tibet. In the northern part of *Nári*, and in *Guzé*, some gold dust is gathered, as also in *Zanskar* and *Beltistan* it is washed from the river. If they knew how to work mines, they might find in many places gold, copper, iron, and lead.

Petrifactions are found at many places in Tibet, especially in *Nári*. On the 2nd and 3rd range of the Himalaya mountains, there are several sorts of them. *Sálgráms* and shells are found most frequently, in many places. All such petrifactions are denominated in Tibetan, according to the resemblance they have to anything; as, sheep-eye, sheep-horn, sheep-brain, swine-head, bird-leg, cow-tongue, stone-trumpet, &c. They are not objects of reverence in Tibet, neither of curiosity. Some of them, after being burnt and reduced to powder, are used as medicaments in certain diseases.

In the whole of Tibet, there is, in general, a deficiency of wood, both for fuel and for building, or timber, especially in *Nári* and *U-tsang*. In *Bhutan* and *Beltistan* there are many sorts of fruit trees. In *Kham-yul* there are some woods and forests. In the western part of *Ladak*, and in *Beltistan* some vines are cultivated. In middle

Tibet and Ladak the mountains are in general naked, destitute of herb, grass, and every vegetable. In the valleys, where the fields can be watered or irrigated, several kinds of corn are produced, especially wheat, barley, buck-wheat, millet, pease, and some others. In *Nári* and in the northern deserts of Tibet, there grow several kinds of medicinal herbs and plants, and there are likewise good pastures; but there are in the deserts no fields for producing corn, and what they want they purchase from those who inhabit the southern parts of *Nári*, and give them in exchange yaks, sheep, wool, woollen cloth, salt, borax, &c.

Rice is no where cultivated in Tibet. There are some kinds of pulse; as pease, bean, and lentils. There is no great variety of esculent plants. They have some turnips, cabbages, carrots, onions, garlicks, and a few others; but for potherbs they use in general such greens as grow wild. In the western part of Ladak, in Purik, there is a certain plant, (with bushy stalks) called *Prángos*, which is a good remedy against the rot in sheep, if given for food for a certain time, in autumn.

The daily food of the Tibetans consists, in general, of gruel, or thick pottage prepared from the meal of parched barley (*satu*), several kinds of flesh, bread, sour-milk, curds, potherbs, and of tea prepared in a particular manner in a churn, with butter, salt, and with some milk, or without this last ingredient.

The origin of the Tibetans is referred in their fabulous history to the union of an ape with a she demon. Some derive them from India; some from China; others from the Mongols, and others from the Turks. Nothing can be certainly said in this respect. They have an original language, which has little affinity to that of any of the nations mentioned. It is probable, that the royal family who reigned in middle Tibet from about 250 years before Jesus Christ till the 10th century, was derived from India, from the *Lichabyi* race, and it is certain that their religion and literature is of Indian origin. The Tibetans are ignorant of their origin. They distinguish now five sorts of people or races (or nations) among themselves; as 1. *K'ham-ba*, one dwelling in *K'ham-yul*. 2. *Pot-pa*, one inhabiting *U-tsang*. 3. *Brok-pa* or *Hor-pa*, one living in the deserts to the north-west of Lhassa. 4. *Nári-pa*, one of *Nári*, *Ladak* and *Beltistan*, and 5. *Lho-pa*, one of *Bhutan*. All of whom have yet other subdivisions. They differ much from each other in their stature, character, dress, and in the accent with which they pronounce the Tibetan language. But they can all understand each other. They all agree (with the exception of the Mahommedans in *Ladak* and *Beltistan*) in having the same religion, whose records are in the same language and character.

II.—*Account of Barren Island, in the Bay of Bengal, drawn up by the late Dr. J. Adam.*

(Read at a meeting of the Asiatic Society.)

Barren Island, with its volcano, from which the accompanying specimens were obtained*, has been described in the 4th vol. of the *RESEARCHES* by Lieutenant (now Colonel) Colebrooke. That gentleman, however, did not visit it himself, but was indebted for his description to Captain Blair, who appears to have surveyed the whole cluster of the Andamans. The account is altogether very short, and any further particulars regarding the island, I have conceived, may not prove uninteresting. In this hope, I now beg leave to lay before the Society the following narrative, communicated to me by the same gentleman who has contributed the specimens. I shall give it in his own words, and I trust need make no apology for so doing.

“In the month of March last, in the passage from Carnicobar to Rangoon, I had occasion to approach close to Barren Island. It was first visible at daylight, and at 7 A. M. being within 10 or 12 miles of it, I could plainly perceive with my glass, volumes of white smoke issuing from the crater of the volcano. About 9 o'clock, we were very close to it, and being attracted by the singular appearance presented to us, and the wind at the time being adverse, I determined on visiting the island. Accompanied by my chief officer, I pulled for a small bay where, it was supposed, we should have no difficulty in landing. On approaching however to within a hundred yards of the shore, we were suddenly assailed by hot puffs of wind, and on dipping our fingers into the water, were surprized to find it as hot almost as if it had been boiling. The stones on shore, and the rocks exposed by the ebbing of the tide, were smoking and hissing, and the water was bubbling all round them. At this place we had a complete view of the cone, which did not then appear a quarter of a mile distant. Being unable to effect our object here, we pulled a little to the southward, and landed in a cove. We now commenced ascending an almost perpendicular precipice, holding on by the loose grass that grew out of the ashes covering the rocks. With no small danger and difficulty we reached the top of the cliff, and had before us a smooth surface of ashes, extending to what we supposed to be the summit of the island. There being nothing to hold by, and the acclivity very abrupt, we all joined hands, and in this way, at length, succeeded in gaining the top of a ridge. Here

* These specimens are, or ought to be, in the cabinet of the Asiatic Society.

we found a small tree, or rather large shrub, and being much fatigued with our previous exertions we sat down under its shade, and enjoyed from thence a fine view of the volcano. It is an immense cone, regularly sloping from the base to the summit, and in appearance and color (to compare great things with small) resembling a heap of sifted coal ashes, with cinders scattered over its surface. I cannot say exactly what the diameter of the base may be, but should suppose it not less than 800 or 1000 yards; at the top it may be about 30, and the whole of this space seems occupied by the mouth. Even at this height I could observe no flame, but large volumes of thin white smoke kept continually issuing from it. This cone stands by itself in the centre of an amphitheatre of hills, which nearly close around it; the only opening to the sea being where we attempted to land. The summits of the hills to the N. E. are completely smooth, and covered with ashes; those to the S. W. although partly covered with ashes also, have a good many small shrubs scattered over them, with dry parched grass growing on the surface. This appearance countenances a belief, that it is only in the south-west monsoon, or rainy season, that eruptions take place, at which time the S. W. wind would blow the dust and ashes on the hills in the opposite direction, or N. E.

“ Having dispatched a lascar from the spot where we sat down, to ascertain if it was yet far from the summit of the Island, he returned and stated, that we had apparently advanced a very little way compared with what still lay before us; and that we could not accomplish our object and be back before dusk. We therefore thought of descending, and as it would have been dangerous to do so the same way we came up, we were obliged to go by the other side of the ridge, where we had some grass, and occasionally a shrub or two to hold by.

“ We now rowed to where we first endeavoured to land, and found that the tide had flowed several feet, which enabled us to have the boat close in, and step on shore on the rocks. Being desirous to examine the crater, we had to walk about three quarters of a mile over immense fragments of the specimen No. 1, which extended from near the sea side to within a short distance of the volcano, and along the only valley or outlet that the island presented. From whence this rock was derived, I could not decidedly say. It was lying carelessly and so loosely as hardly to afford a sure footing in walking over it. It is indeed difficult to describe the form in which this was lying, for were you to take any quantity of large and small pieces of No. 1. and throw them down in the most random manner, you could not make them assume the strange disordered appearance that nature

here presents. I should not suppose that these masses were thrown from the volcano; as in that case, it appeared to me they would have been agglutinated together when in a state of fusion from intense heat, and also fixed to the surface. The impression on my mind at the time was, that some faint convulsion of the earth had elevated them directly from below. Along this dark tract there was no ashes, nor any thing indeed but the rock itself. On reaching the base of the cone, I casually picked up the specimen No. 2. Here viewing it, I judged the elevation to be half a mile to the top; but in my estimation of distances I do not pretend to be even near the truth. It sloped so suddenly from about halfway up to the top of the cone, that I considered it next to impossible to climb to the mouth. We ascended however 30 or 40 yards, sinking ankle-deep in ashes, at each slip, and I here took up the specimens Nos. 3 and 4, and the other two smaller pieces. I did not bring away any specimen of the ashes, but the color exactly resembles that of No. 3. In the whole of our ramble, we did not meet with a spot capable of yielding any vegetation, with exception of the withered grass formerly alluded to: nor, although we looked anxiously for fresh water among the rocks, could we perceive the smallest signs of it. The geographical site of the Island as given by Horsburgh seems perfectly correct; at least it agreed with my observations. The shore is extremely steep, and a ship may almost rub her side against the rock. Close in shore we could observe either tides or currents setting on eddies round some of the points; and in pulling from where we first endeavoured to land, to where we did land, we were in rippings."

On examining the specimen No. 1, it is evident that it must have undergone the action of fire; and notwithstanding the above opinion to the contrary, it has in all probability been ejected from the crater of the volcano. On this point indeed we have positive evidence, as Captain Blair, in Col. Colebrooke's description, declares he saw these masses thrown out from the volcano in a state of ignition, "many of which rolled down the cone, while they were close to it, and bounded a considerable way beyond them." The black scoria seems to derive its color from an impregnating iron; it contains minute crystals and grains of felspar. The specimen No. 2, resembles the former, but has been thrown from the volcano at an earlier period, and exhibits the contained crystals in a state of decomposition. No. 3 is a very compact lava, containing embedded in its substance distinctly crystallized basaltic hornblende. No. 4, though vesicular, is more compact than the two first varieties. Besides the felspar, it contains some dark-colored crystals, the nature of which I have not fully ascertained.

I may add, that the conjecture, respecting the volcano's being in activity only during the S. W. monsoon, derived from the appearance of the hills, is supported by analogy in similar cases, as it has been frequently observed that volcanic eruptions are influenced by the state of the atmosphere. In a late number of the Edinburgh Philosophical Journal, I met with a notice on this subject, which I shall here take the liberty of transcribing. Under the head of "Detonations in Mount Brazier," it is stated, that M. Dubois Ayne examined in 1818, the structure of the mountain situated between Senes and Leerogne in the Alps, which is known to emit flame, and produce detonations, which are most frequent when the wind is in one direction. He found that there were beds of pyritous chalk, marly schistus, radiated sulphuret of iron, and bituminous substances, &c. in the strata of limestone that formed its sides, and he supposes that the flames and detonations are produced by the accidental inflammation of hydrogen liberated by the action of water on the above substances." As rain generally accompanies the S. W. monsoon in the Bay of Bengal, may we not reasonably infer, that the activity of the volcano on Barren Island at that season also depends on the presence of water and its consequent conversion into its gaseous elements?

III.—*Flora Indica, or Descriptions of Indian Plants.* By the late William Roxburgh, M. D. F. R. S. E. &c. &c. Vols. I. II. and III. Printed at Serampore, 1832.

[To be completed in four volumes.]

The appearance of the above work may well be considered as a subject of congratulation, not only as a lasting tribute of justice to the memory of one of our most distinguished men of science, but also as affording our countrymen, in this country, the means of prosecuting a very pleasing branch of their studies in Natural History.

The length of time that the present work has remained in manuscript, within the precincts of this metropolis, would argue either an apathy on the subject, or that the work itself had not been considered of sufficient value to risk the expences of publication. But that this cannot have been the reason is evident from the fact, that the two first volumes, which were published twelve and nine years since, had so extensive a sale as to have been long out of print, while inquiries too respecting it have continued as numerous as ever; and there is no doubt that, had this work been published many years ago, it would have had not only an extensive circulation, but it would have been the means of producing a considerable number of zealous botanists, who would have

investigated what was described, and described what they found to be new : for at present, though there are numbers well inclined to prosecute the study of Indian Botany, of whom many are placed in the most favourable situations for obtaining a name, at the same time that they might contribute to the progress of the science ; yet that the number of actual cultivators have been so few, can only be ascribed to the difficulty which each has had in prosecuting a subject on which no books were procurable ; and without these, we are apt to fancy that we can do nothing, or suppose that we can find nothing which has not been already discovered. That nothing can be more erroneous is evident from the fact, that even in well-explored countries, such as England, Scotland, and France, many new plants have been found even in the most recent times.

The appearance of this work is to be considered an important circumstance, not only for the information itself communicated, but also from its being in an English dress ; for the neophytes of science will be more readily induced to enter a mansion of which the threshold is made accessible. Nothing so much promotes the spreading of a science as the publication of works of a popular nature and compendious form, and the present will be the forerunner of many such. That some attempts of this kind have not hitherto been made, can only be accounted for, by the supposition, that those who have laboured to acquire a knowledge of the science, surrounded as it is with great difficulties, have rather employed themselves in exploring new fields, than in endeavouring to assist others up the toilsome ascent, which they had by dint of much labour themselves ascended.

That materials have not been wanting for giving a short though imperfect view of Indian Botany, may be inferred from a view of the numerous species and genera of Indian Plants which are enumerated in the System of Willdenow and the Synopsis of Persoon. If the Indian species in these works had been extracted and published in a separate work in English, something might have been done towards inducing a greater taste for Indian Botany. But in justice, the want of such works must, in a great measure, be ascribed to the want of encouragement, and the apathy with which all endeavours to prosecute any of the branches of natural, or any other science, are viewed in India, and most other English colonies ; where what is pleased to be styled *practical* knowledge, is alone valued, and the inutility of scientific acquirement dilated on with a degree of complacency which is amusing, as chiefly indulged in by those who are totally unacquainted with the nature and objects of the species of knowledge they affect to despise, and the ultimate tendency of which they would perhaps be the more surprised to find was to produce the most certain practical results.

That materials have not been wanting we repeat, is evident, if we call to mind the authors who have expressly written on Indian Botany ; and among these, it is lamentable to find, that until the time of the author of the present work, none of our countrymen had distinguished themselves in the field.

As not having written expressly on the subject, it is perhaps needless to mention the names of Theophrastus, Dioscorides, and Pliny, though in their works many plants are mentioned as being natives of India, and these form very interesting subjects of research in the present day, besides Galen, Oribasius, Paulus Aegineta, and among the Arabians, Mesue, Serapion, Rhazes, Avicenna. By the latter authors many plants are mentioned, as being the produce of India, of which no attempt appears hitherto to have been made towards their identification. Ibn-ul-Bakhtar is said to have traversed Africa, Arabia, and India, for the prosecution of his favourite study of plants : his MSS. in the Escorial, contain descriptions of several thousand species ; and his work, which is frequently referred to by the Persian authors on *Materia Medica*, was much consulted in the composition of the *Geographia Sacra* of the learned Bochart.

The earliest Europeans who seem to have paid any attention to the useful plants of India, are the Portuguese physicians at Goa, Garcia *ab Horto* and Christopher da Costa, whose observations, with those of Belon, form the basis of the work of Ausius entitled *Exoticorum libri decem*. Antwerp, 1563. In the works of Prosper Alpinus, though on the plants and medicine of the Egyptians, many plants are mentioned of which the products are brought from India.

The first work, however, of any note on the plants of India is that of Rheedee, entitled *Hortus Malabaricus*, in 12 volumes, folio, containing 794 plates, which, considering the time they were published, are highly creditable productions. Rheedee resided chiefly on the Malabar coast, and was Governor of the Dutch settlements in the East Indies ; he procured all the new and curious plants in his power, described them, and had drawings made ; the plates have in them the native names, with the Arabic and Hindi characters. Plukenet collected nearly 8000 plants, and his works give plates of nearly 3000 species, among which are several Indian plants.

Kämpfer travelled in Persia, Arabia, and India on the Coromandel coast and along the banks of the Ganges, Java, Japan, &c. and his work *Amœnitates Exoticæ* contains accounts of many, and plates of some, plants of Japan, of which nearly allied species are found in the Himalayas. The sixth number of his work, which contained 600 figures of scarce plants growing along the Ganges, has been entirely lost.

Burmah, in his *Thesaurus Zeylanicus*, 1737, has given descriptions and figures of many Asiatic and some Indian plants.

Rumph came as physician to the East Indies, and became Chief Magistrate and President of the Mercantile Association of Amboyna; he collected carefully all the productions of India, especially plants. These are described and figured in his work, *Herbarium Amboinense*, 1750—1755, in six volumes, folio, with a supplementary or 7th volume bound up with the 6th. The descriptions are in Latin and Dutch, in separate columns, and the figures are extremely good.

N. J. Burmann, son of John Burmann, was Professor of Botany at Amsterdam. In his *Flora Indica*, 1768, he has represented in 67 plates, 176 very scarce plants, which had been collected by his father.

Rottler, Professor of Botany, at Copenhagen, has given excellent figures and descriptions of many of the Indian *Cyperaceæ*. This work is in folio, published in 1773, with 21 plates.

Retzius, Professor of Botany at Lund in Sweden, published in six *Fasciculi*, from 1779 to 1791, in folio, with 19 plates, many Indian plants discovered by travellers, particularly Kœnig, who visited both the Coromandel and Malabar coasts, as well as Ceylon and Siam.

Thunberg, in his *Flora Japonica*, has given descriptions and figures of many of the plants of Japan, several of which, or nearly allied species, are to be found in the Himalayan mountains.

Though not strictly Indian botanists, it is sometimes useful to refer to those who have written on the botany of neighbouring countries, especially Asiatic; and among the most useful of them may be mentioned the work of Forskal, on the plants which he found when travelling with Niebuhr, in Arabia. The Indian reader will be surprised to find so many names with which he is familiar: the Arabic names being given both in the English and the Arabic character, and without doubt introduced by the Mahomedan conquerors into India. Fr. Hosselquish travelled as a botanist in Syria; Olivier and Michaux in Persia, and Pallas in Siberia. Loureiro, a Portuguese, went as Missionary to Cochin China, but as he could not without medicine succeed in his plans, he studied the productions of the vegetable kingdom. The *Flora Cochin-chinensis*, edited by Wildenow, contains descriptions and plates of the plants he found in that country. Sonnerat died in 1813, after having employed 20 years in his travels; he visited the isles of France and Bourbon, Madagascar, the Phillipines, Moluccas, New Guinea, the Coasts of Malabar and Coromandel in India, Ceylon and China. Many of his plants are described by Lamarck in his invaluable *Encyclopedie de Botanique*.

We now come to the time of the author of the present *Flora Indica*, who independent of many contributions to the transactions of learned societies, and to the periodicals of the day, was principally brought to notice by his work entitled *The Plants of the Coast of Coromandel*, which was published by the order, and at the expence of the Honorable the Court of Directors, the selection being made from five hundred drawings and descriptions presented by Dr. William Roxburgh, then their Botanist in the Carnatic. With a more immediate view to utility, preference was given to subjects connected with "medicine, the arts, or manufactures ;" but new plants also were admitted, or such as had hitherto been imperfectly described, although their qualities and uses remained unexplored.

John Gerard Kœnig, a native (it is believed) of Courland, came to India in 1768, under the protection of the king of Denmark, chiefly for the purpose of studying the natural history of the country : he was prosecuting his botanical researches in the Carnatic, when Dr. Roxburgh, who entered the service at Madras in 1766, became acquainted with him. Dr. Roxburgh had applied to botany under Dr. Hope in the University of Edinburgh, and bringing with him to India a love of the study, he found in Dr. Kœnig an experienced conductor through a wilderness as yet unexplored by either.

On the death of Dr. Kœnig, Dr. Russel was nominated his successor ; he contemplated the publication of a work on the useful plants of Coromandel, which though perhaps less generally interesting to the botanists in Europe, might prove of real service to India.

Circular letters, with a list of the plants proposed for the first publication, were sent by the Medical Board to the subordinate settlements, requesting it might be favoured with any information respecting the subjects in question, which the medical gentlemen might have it in their power to communicate ; and in consequence several useful communications were received. Dr. Russel however left India before the proposal could be carried into execution. But as the object was approved of by the Court of Directors, the directions their letter contained fell fortunately into hands well qualified for carrying them into execution.

Our author, now disengaged from the duties of his station, was pursuing his favourite study at Somalcottah, when he thus became permanently attached to botanical pursuits. He had made experiments on the cultivation of pepper and indigo ; had written on qualities of the Swietenia bark, and had communicated other discoveries, to the *Philosophical Transactions*, the *Indian Repository*, and the *Asiatic Re-*

searches. He had made large collections of plants in the Carnatic, and for several years previously to his appointment had retained a painter constantly employed in drawing plants, which he accurately described, adding such remarks on their uses as he had learned from experience or collected from the natives.

The drawings and descriptions arrived in England in 1791 and 1794, when the number of 500 were completed. It was from these that the first selection was made.

Sir Joseph Banks undertook the superintendence of the engravings, and Dr. Russel of the letter press, in consequence of Dr. Roxburgh's intended residence in India, as he was in 1793 selected to be superintendent of the botanical garden at Calcutta. After many years of laborious investigation he was compelled to visit his native country for the recovery of his health; but he died, as we learn from his son, at Edinburgh, in February, 1815.

The work now consists of 3 volumes, in large folio, with 300 plates drawn in a very superior style. They are selected chiefly for their useful properties, as may be observed in the long account given of the *Oldenlandia umbellata*, Chay root or East Indian madder; the numerous experiments shew the care that has been bestowed on the application of botany: also in the account of the sandal-wood tree, the Catamaran tree, *nux vomica*, cleaning nuts, the teak, several esculent species of *ceropagia*, marking nut, Sapan-wood tree, *Swietenia febrifuga*: the *mehwah* tree, the *butea frondosa*, with experiments on its gum; *embryopteris glutinifera*, *phœnix farinifera*, *areca catechu*, *feronea elephanta*, *Ægle marmelos*, *mimosa Arabica*, *Rottlera tinctoria*. Under *mimosa catechu*, it is observed, "but the natives have no idea of extracting from it, or any other, the extract called *catechu* (*terra Japonica*):" this is an inaccuracy, as large quantities of *catechu* are made from it in the upper provinces of India. *Terminalia chebula*, with directions for dyeing yellow: *Shorea robusta*, *Dipterocarpus turbinatus*, the Cardamum tree, *Scirpus tuberosus*, or water chesnut of the Chinese, *saccharum Sinense*: the *Sona* tree, *Gmelina arborea*, for fibres: observations on the different kinds of cotton.—The above list shews the number of useful plants, described and figured in the great work of Dr. Roxburgh, a work perhaps less known in India than in any other part of the civilized world.

It may appear that much time has been unnecessarily employed in noticing a work of Dr. Roxburgh's, which has no immediate reference to that now under consideration; but the fact is, that the two works, though published at such considerable intervals, are closely connected.

together, form one whole, interpret each other, and are well calculated to give a correct view of his labors as an Indian botanist.

The present work, containing descriptions of all the new plants which he had discovered, as well as notices of those which, though previously described, he had found in India, was completed many years ago, and the manuscript deposited with Dr. Carey, the venerated Editor of the work. An idea of the labours of Dr. Roxburgh may be formed by an inspection of the catalogue published by Dr. Carey, called the *Hortus Bengalensis*, and which may be considered an index to the present work. This was published in 1814, at the time that Dr. Roxburgh was obliged to make a voyage to sea for the benefit of his health, when Dr. Carey embraced the opportunity of his absence to bear testimony to those abilities, that zeal and success which had been so eminently displayed in bringing the Botanic Garden to its then state of perfection. We quote his words from the Government Gazette of August, 1831.

“The garden was begun by Colonel Kyd, in March, 1786, and collections of plants from different parts of the east were soon introduced into it with such success, that the number of plants brought into it in eight years amounted to more than three hundred. Dr. Roxburgh joined it in autumn, 1798. His unremitting attention to its improvement, and his eminent abilities as a botanist, are far more fully exhibited in the following catalogues than they could possibly be by any eulogium from a friend. The number of described species now in the garden amounts to 3500; for the knowledge of no fewer than 1510, as named and described in this catalogue, we are indebted to his indefatigable and discriminating researches. Among these are a great number of new genera, some of which have a considerable number of species ascertained; to these should be added those plants contained in the second catalogue which, though not in the Botanical garden, have been described and many of them accurately drawn by him: these amount to 453. The extensive correspondence which he maintained, not only with gentlemen in all parts of India but in most parts of the world, will be witnessed by the list of donors to the garden which he superintended; and the liberality with which he always communicated to those who applied to him, requires no other witness than the universal voice of the inhabitants of India, and even of many in Europe and America, to whom he constantly sent supplies. He was elected member of the following Societies:—Phil. Soc. and Linn. Soc. of Philadelphia,—Soc. Encour. Arts,—Roy. Soc. Physicians, Edinburgh,—Linn. Soc. London,—Roy. Soc. Edin.—Soc. Nat. Hist. at Berlin.”

The above extract gives a succinct view of the invaluable labours of Dr. Roxburgh, and though his work cannot be considered as an entire account of all the plants of India, yet it is a tolerably full one of what is commonly considered India, that is of the peninsula and of the plains of Hindústan; for in Dr. Roxburgh's time the north-western and hill provinces were little known, and Silhet, Assam, and Ava, had been, with the exception of the former, but little explored. It is still therefore, though completed so many years ago, the best work we have

on Indian botany, and the two volumes now published, give a true indication of the value of the two others, which are to follow immediately to complete the work. The *Hortus Bengalensis*, of which a reprint appears to be imperiously called for, gives a list arranged according to the Linnæan classification of all the plants which are described in Dr. Roxburgh's *Flora*. In this list, opposite the Botanic names, the Indian ones are given, together with the places of growth, names of donors, duration and habit, time of flowering and of seed, with frequent reference to figures of the plants, in the works of Rheede and Rumphius. A portion of this work, extending as far as nearly to the end of *Pentandria Monogynia*, was formerly printed, with which the invaluable additions of Dr. Wallich were incorporated. But as this volume of the work has been long out of print, and as the sons of Dr. Roxburgh were anxious that the *Flora Indica*, on which he bestowed so many years' unremitting labour, should be presented without any further delay to the scientific world, Dr. Carey, at their request, has superintended the progress of the present edition through the press: not considering themselves however at liberty to make use of Dr. Wallich's invaluable notes and additions, Captains Roxburgh have omitted them in reprinting the first part of the work. The present edition of the *Flora*, therefore, to be completed in four volumes, will consist of the manuscripts left with Dr. Carey by Dr. Roxburgh, without any addition. We therefore miss along with Dr. Wallich's additions Dr. Carey's various Sanscrit Synonymes, which added so much value to the former edition.

The volumes under review extend to the end of *Polyandria Polygynia*. From the nature of the work it is not easy to give an idea of its contents, except by mentioning that it contains descriptions in English of most of the plants usually found in India, exclusive generally of those of the hills, as far as the first thirteen classes. Dr. Roxburgh's high character as a botanist will be a sufficient warrant for the correctness of the specific descriptions. Generic characters were not so much or so accurately studied in Dr. Roxburgh's time, as they are now. The general reader may obtain a tolerable idea of their value by turning to the several articles where the useful properties of the plants are particularly described. In the first volume, we would particularly refer to the valuable notices respecting the several useful species of *Curcuma*, from one of which an excellent substitute for Arrow-root is procured;—the different kinds of ginger;—of cardamum;—the observations at p. 85, respecting the manufacture on the coast, of barilla;

—the superiority of the China sugar-cane, at p. 240, over that commonly cultivated in India ;—at p. 476, *Convolvulus Turpethum* used as a purgative by the natives of India ;—the observations on *Sapistanum*, at p. 589, and at 617, on *Scopolia aculeata*, as a cure for jungle fever. In the second volume *Nerium tinctorium* is mentioned as producing a kind of Indigo, and *N. tomentosum*, a yellow dye ; *Asclepias asthmatica* is highly spoken of as a substitute for ipecacuanha ;—the *Asclepias tenacissima* as yielding fine silky fibres, of which the mountaineers of Rajmahl make their bow-strings ;—*Asclepias tingens* is mentioned as yielding a green dye ;—*Salsolanudiflora* for the production of pearlash, and *Sansevieria zeylanica* as affording what is called China grass. Most of the Indian trees and plants, remarkable for any useful properties, are always indicated, and the native names being mentioned under the botanic ones, facility is afforded for obtaining any of the articles that may be required for experiment.

In conclusion it may be useful to indicate, that if the generic characters were all printed in a tabular form at the commencement of each volume, considerable inconvenience would be saved in discovering the genus of a plant with which we are unacquainted ; for instead of turning over to the generic characters throughout the volume, we should have them presented to us within the compass of a few genera. If the learned and highly venerated Editor should not consider it as coming within his plan to embrace our suggestion, we will in a subsequent number of the Journal offer in a tabular form all the genera contained in Dr. Roxburgh's four volumes of the *Flora Indica*.

IV.—*A Sketch of the Route and Progress of Lieutenant A. Burnes and Dr. Gerard.* By a recent Traveller.

[We have to thank our correspondent for the following sketch of the proceedings of two travellers, upon whose adventurous journey to explore the Oxus are directed the eyes of all who are interested in geographical research. The information is evidently drawn from private letters, but we trust, that the authors will not deem the publication of the extracts to which we have confined ourselves, premature, only because they were not expressly written for such an object.]

Before the travellers quitted the last civilized capital on the north-west, the splendid city of Lahore, so much celebrated for its palaces, gardens, and mosques, densely populated by an active and cheerful race, Ranjit Singh desired to leave an indelible impression on their minds of the splendour of his court. Dr. Gerard writes :

“ Our entertainment might be compared to those splendid feasts described in the Arabian Nights ; we were transported into a little “ paradise of pleasure ; the Maharaj himself tasted, in more senses than “ one, of the intoxication of the scene, and ere morning most of his “ chieftains and guests were ‘ hors de combat.’ ”

Having procured letters of introduction to the several chiefs who occupy the west bank of the Indus, and provided themselves with *húndís* to an ample amount on the *kotís* of Peshawur and Kabúl, the travellers left Lahore about the beginning of March. In their progress towards the Indus, they visited the great salt range which stretches between the Indus to the Jelum, and made a considerable deviation from the straight road to visit *Dádan Khán*, where some of the chief excavations of the article exist*.

While on the banks of the Jelum, they were much struck by the immense size of the firs floated down the river ; the houses in all the towns along its banks are roofed therewith. Immense cedar trees were seen rolled down from the hills ; it was these that supplied materials for Alexander’s fleet : one tree measured thirteen feet in girth, which may afford some idea of their applicability to ship-building.

From *Dádan Khán* they went to *Darapúr* on the Jelum, but notwithstanding a very active search they failed to discover the remains or site of the city of Bucephalus, founded by Alexander, in honor of his famous charger. The celebrated fortress of *Rotas*, is situated a short distance to the west of the town and river of Jelum, near a broad sandy stream, which contains little water. This fortification was built by the well known Patán emperor Shér Shah, who expelled Hamayún, the son of Baber Shah, from the throne of Delhi.

Lieutenant Burnes and Dr. Gerard halted one day to look at this noble fortress, but they deem it, “ with all its formidable extent, a piece of stupendous folly.”

The next place of interest the travellers visited, was the tope of *Manikyála*, the history of which ancient structure still remains a problem. They obtained many coins with devices apparently Grecian, from the peasants of the neighbourhood†. Dr. Gerard observes, that although the probable inference is, that from “ any of the memorials which have been discovered, the tope marks the site of the town of Taxilla, the appearance of the building does not accord with so great

* An account of these mines by Lieut. Burnes will be found in the present number.

† Three of these coins, and impressions of one more and of two ancient gems, have reached us, which in addition to the coins discovered by Colonel Ventura, are now under investigation.—ED.

antiquity. Two thousand years make sad havoc in masonry ; it is more likely that it belongs to the Bactrian dynasty." The construction, the figure, and isolated situation of the tope of *Manikyála*, is certainly of a singularity to attract the attention of all travellers ; but there is nothing in the mere workmanship that would lead one to suppose, that it may not have been executed by the inhabitants of the neighbourhood. This is perhaps satisfactorily proved from the existence of several monuments of the same shape, on the west of the Indus, and from a comparison with an ancient building in the immediate vicinity. The building alluded to is a saint's tomb, surrounded by a stone wall, about a mile from the tope to the southward. The building material is the same ; a porous limestone, which is dug out within a short distance of the surface of the ground, in fact indurated *kankar* : similar specimens of which are, to be met with in various places between the Jumna and Ganges. At the Khyber pass, on the road from Peshawur to Kabúl, another tope of much the same construction is found ; as likewise at Balabágh beyond Jelalabad, on the same road. Without comparing all these edifices together, we cannot very well form a correct opinion ; but it may be doubted whether either the Grecian or Roman edifices, which have survived the wreck of time, can furnish an example at all corresponding to the tope of *Manikyála* ; and if such a doubt proves to be true, we can scarcely longer abstain from giving the people of the country credit for erecting this mausoleum, for such we take it to be, as there is no evidence of its utility to men who are alive. After leaving this place, they visited Ráwal Pindi, a large and well inhabited town ; it was here that Shah Sujah passed a considerable time after being expatriated ; it is situated near the mountains, and the climate is excellent. "There are many pleasant vallies in the neighbourhood ; but what conveyed most gratification to the travellers was the enchanting wild and beautiful garden of Hosein Abdaleh, situated under the brow of a mountain, copiously watered by streams of clear transparent water, decorated with all sorts of exotic flowers, shrubs, and plants ; it was here they reposed their weary limbs ; they found rest and stillness in this mansion of delight and tranquillity ; they remembered a pleasing description of it in Lalla Rookh, but regretted they had not the book to ascertain how far the picture corresponded with the original. They were surprized with the variety and number of trees ; the romantic nature of the scenery ; the rich verdure and the tout ensemble made them feel as if they stood on English ground : but desolation was worn by every thing visible ; the garden mourned and had put on its

weeds of woe; summer houses and once gay retreats were tumbled from their exaltation; they were in heart-sickening ruin. Even the trees suffered grief and vexation; a violent tempest a few years before had up-rooted some of the finest, and they now lay low with their drooping heads in the water." At the town of Hosein Abdali, is a saint's tomb, around which is a fine stream of water full of fish. One of the great roads to Kashmîr passes this place, and strikes into the hills, bringing the traveller to Kashmîr in seven days. After leaving Râwal Pindî, a causeway cut through a hill is passed; it is excellent of the kind, but one does not exactly feel convinced of the important utility assigned it. In the centre of it, on one of the walls, is a Persian inscription, denoting that it had been constructed in the time of Shah Jehan; but much of the context was obliterated. From Hosein Abdali our travellers made their way towards the Indus; here they were met by Hari Sinh, who shewed them every attention.

It is now necessary to advert to the nature of the country passed between Lahore and this river. Between Lahore and the hills, on which stands *Rotas*, is an uninterrupted level plain, confined by the Himalayan branches of hills on the north, and various chequered and intersected plains on the south. They passed over the three principal streams of the Panjâb; the Ravi, the Chinâb, and the Jelum, and the most populous and best cultivated part of the Panjâb. The country, &c. as far as *Rotas*, in appearance resembled Hindûstan: the people, their customs, their houses, their crops and cultivation, their dress, all appeared but little modified. The flatness of the country, the aspect of their towns and villages, surrounded by groups of trees, gave little or no indication of change; but beyond *Rotas*, the country assumed broken and highly contrasted features; small ranges of hills met them on the right and left; small streams were frequently passed. The elevation of the country, according to Dr. Gerard's barometric observations, now became above two thousand feet above the level of the sea. The climate was materially modified, and they even experienced hoar frost, and sand ice, as late as the 10th and 12th of March. The climate was good, and the air temperate all day. With the nature of the country, the inhabitants also seemed less polished, severer in their manners, and less easy in their circumstances; the population was also scantier, the villages fewer, and far between: the northern hills now frowned more immediately upon their course, and tended to increase the comparative desolation of the country; the stories of the murderous *Gakers*, the tales of the successful resistance or easy conquest of the strong places they passed, harmonized with the scenery. They now felt

that they were really beyond the boundary of Hindústan. Our travellers prepared themselves now for the assumption of the native dress, and began gradually to accustom themselves to the adoption of oriental manners and customs. This was done to secure them from attracting notice, and thus ensuring their personal safety, and a free intercourse with the people of the countries through which they might pass. Dr. Gerard writes : " After leaving Lahore, we began to assume the native costume, and divest ourselves of the cumbrances and comforts of civilized life, and we are now (Atok, 16th March,) in every respect in a suitable condition to mingle with the Afgháns, and even to encounter robbers. Our poverty will however protect us ; our beards are growing, and our faces are getting black from the sun's ardour. Our habits cannot be too coarse to correspond with our vagrant character. I wish other parts of us besides our face would change colour, as we are liable to be betrayed by our awkward attitudes. Our shirts stick close to our backs, as we cannot afford their renewal ; in fact our clothes are still too good, and the sooner they become greasy the better. Two mules carry all our baggage and servants : our beds are upon our horse rolled up like a pedlar's pack. By and bye we shall mess with our servants, of whom we are already a counterpart ; and when we say our prayers five times a day, and use our fingers for chopsticks, we shall pass on unnoticed. We have parted with every superfluity ; it was with regret however that I gave up two of my spare barometer tubes :—the instrument still remains, and if I am so fortunate as to get an observation on the *Hindú kush*, I shall be satisfied ; in case of fracture, our thermometers will still give approximate altitudes."

Having reached the Atok, they were welcomed by Hari Sinh, whom they found encamped in the plain of the Indus ; they paid him a visit in his tents, which brought back the scenes of Lahore grandeur. Hari Sinh having forded the river the previous day, they were determined to try the same experiment, and accordingly proceeded on elephants with him ; but the enterprize cost them the sacrifice of a man and two horses ; the people struggled, and losing the ford, were swept down by the rapid stream : seven sawars lost their footing, but all were recovered, except one. Their elephant rolled deeply, but never had occasion to swim ; the next branch of the river was more difficult, but they prevented the horsemen following them ; in recrossing, they kept in close order, and repelled by this means the impetuosity of the current. This stream has been frequently forded by the armies of the Sikhs in latter times with little or no loss of lives. Our correspondent says, that " Atok has

lost much of its repute as a place of strength, since the fords have become so greatly known. Elphinstone speaks of Shah Shujah's passage as a prodigy, and the first of the kind. The Sikhs who accompanied us in our passage, being predestinarians, undertook the fording of the Indus without concern, saying they were accustomed to it."

Lieutenant Burnes writes, that the sand of the Indus, near Atok, yields a small quantity of gold*: the process of extraction by repeated washings is very tedious. Quicksilver is employed to take up the gold, by amalgamation, from the coarser grains which remain on the sieves. Some of the smaller rivers falling into the Indus are said to contain more gold than the latter.

The same traveller also describes a curious phenomenon observed at the confluence of the Indus and Kabúl rivers, half a mile from Atok, (for Macartney's map is here in error,) in the following words: "An *ignis fatuus* constantly shews itself in this place; two, three, and even four lights are visible at a time, and continue to shine through the night. It appears at first sight to be the reflection of the water on the rock, well smoothed by the current; but then it only shews itself in one particular spot, and though the whole banks are so smoothed, it is confined to a few yards. There was and could be no deception: the natives cannot account for it, and its continuance during the rainy season is the most inexplicable part of the phenomenon in their estimation. The valiant Mán Sinh, who carried a war of revenge against the Mahomedans beyond the Indus, fought a battle on this spot, and the lights are considered by some as the departed spirits of the slain. For my own part I cannot solve the mystery regarding this "Will o' the wisp," which I only credited after having seen it." The water of the Indus has the reputation of being specifically cold, but this is a vulgar error arising from the relative difference of temperature between the river and atmosphere. On the 18th March it was 22° Farh.

While at Atok, our travellers received friendly letters from the chief of Peshawur, Sultan Mahomed Khan, and they were the more acceptable as they had not sent information to him of their approach. For this civility they believe they were indebted to Shah Shujah; however they would have rather wished that it had been omitted, as it was scarcely their intention that their progress should be made a matter of notoriety. While on this subject, Dr. G. makes the following remarks: "It is quite ridiculous to view ourselves as natives, while every other person sees through the thin veil of dissimulation; we

* A specimen has reached us in safety.—Ed.

are however passing the best way for our safety and comfort, by appearing in the dress and habits of the country, by which we shall avoid the idle gaze and intrusions of the mob, the importunity of beggars, and the reckless cupidity of robbers. It is impossible for one to assume disguise who has been long at the court of Ranjít Sinh, and who continues to be treated as a Sahib to the very limit of his authority; but it never was our intention to mask ourselves. Sultan Mahomed Khan is going to send horsemen to meet and escort us, which is rather too much kindness, and he will only disgrace himself by caressing such dirty disreputable fellows as we now appear." Ranjít Sinh's troops stationed in this fort made some opposition to the baggage of the travellers being ferried across; the fact was, they were in a state of mutiny in consequence of large arrears being due to them. They crossed shortly after to the opposite side of the river, on which is situated the fort of Khyrabad. On the 10th, they were at Akora, on the banks of the Kabúl river, preparing for their onward journey to Pesháwar.

S. E.

Allyghur, 11th April, 1832.

V.—*Some account of the Salt Mines of the Panjáb. By Lieut. S. Burnes, Bombay Army.*

Locality.

In the high lands of *Kabúl*, between the city of that name and *Pesháwar*, a range of hills springing from the roots of the white mountain (*Suféd Koh*), crosses the Indus at *Hara-bágh*, and terminates on the right bank of the *Jelum*, or Hydaspes of the ancients. This range formerly figured in our maps under the name of *Jood*, after it had passed the river; but it has been more appropriately denominated the salt range, from the extensive deposits of rock salt which it contains. An account of that part of it near *Hara-bágh*, where the Indus in its course southward cuts this range and lays open its mineral treasures, will be found in Mr. Elphinstone's work. In the neighbourhood of *Pind-Dádan-Khan*, a town about 100 miles N. W. of Lahore, the salt mines which supply the northern provinces of India with that necessary of life are excavated in the same range. The following particulars pretend not to rank as a scientific account of these mines, my only object being to convey that information which a journey to so unfrequented a part of the Panjáb has enabled me to collect.

Formation.

The salt range forms the southern boundary of a plateau between the Indus and Hydaspes, which rises about 800 feet from the plains of the Panjáb. The hills rise to an actual height of about 1200 feet from the valley of the *Jelum*, which gives them an elevation of about 2200 feet from the sea. They exceed five miles in breadth. The formation is sandstone, occurring in vertical strata, with pebbles or round stones imbedded in various parts of it. Vegetation is scanty, and the bold and bare precipices, some of which rise at once from the plain, present a frightful aspect of desolation. Hot springs are found in various places. Alum, galena, and sulphur also occur; but a red clay, which is chiefly found in the valleys, is a sure indication of a salt deposit, and it is to be found at intervals throughout this range*. The supply of the mineral is now drawn from *Pind-Dádan-Khan*, whence it can be conveyed with facility both up and down a navigable river.

Mines.

At the village of *Keoru*, five miles from *Pind-Dádan-Khan*, we examined one of the principal mines. It was situated in a valley near the outside of the range, which was cut by a rivulet of salt-water. It opened into the hill through the red clayey formation above mentioned, at a distance of about 200 feet from the base. We were conducted by a narrow gallery, sufficient to admit of one person passing another, for about 350 yards, of which fifty may be taken as actual descent. Here we entered a cavern of irregular dimensions, and about an hundred feet high, excavated entirely in salt. The mineral is deposited in strata of the utmost regularity, occurring like the external rock in vertical layers. Some of them however subtend an angle of from 20 to 30 degrees, and have the same appearance as bricks that have been placed upon one another. None of the layers exceed a foot and a half in thickness, and each is distinctly separated from its neighbour by a deposit of argillaceous earth, about an eighth of an inch thick, which lies like mortar between the strata. Some of the salt occurs in hexagonal crystals, but oftener in masses; the whole of it is tinged with red, varying from the slightest shade to the deepest hue;—when pounded the salt is white. The temperature of the cavern exceeded that of the open air by 20 degrees, when the thermometer stood at 64° (in February). The natives state that these mines are much colder in the hot season, but this only shews that they undergo little or no alteration, while the heat outside increases as the season advances.

* We have safely received the specimens of these minerals transmitted by Lieut. Burnes.—ED.

Mode of working.

There were upwards of an hundred persons, men, women, and children, at work in the mine, and their little dim burning lamps on the sides of the cavern and its recesses shone with reflected lustre from the ruby crystals of the rock. The cavity has been excavated from the roof downwards. The salt is hard and brittle, so that it splinters when struck with the sledge-hammer and pick-axe. The rock is never blasted with gun-powder, from fear of the roof falling in; and accidents of this kind sometimes happen in the present simple mode of excavation. The mines are not worked for two months during the rains for the same reason. The miners live in villages among the hills. They have a most unhealthy complexion, but do not appear to be subject to any particular disease. They receive a rupee for every 20 maunds of salt brought to the surface; a task which may be performed by a man, his wife, and child, in two days. In those mines, where the mineral is near the surface, it is hewn into blocks of four maunds, two of which load a camel, but it is usually broken in small pieces. This salt holds a high reputation throughout India with native practitioners, from its medical virtues. It is not pure, having a considerable mixture of some substance (probably magnesia), which renders it unfit for curing meat. The natives of the Panjáb ascribe the prevalence of *nazla* to its effects. That disease is said to consist of a running at the nostrils, which wastes the brain and stamina of the body; with what truth I know not.

Supply.

As the salt range contains a supply which is inexhaustible, the mines yield any quantity that may be desired. Two thousand five hundred maunds of Lahore, one of which is equal to one hundred pounds English, are extracted daily, which gives about eight lacs of maunds for the year. A few years since this salt was sold at the mine for a half and even a quarter of a rupee per maund, but its price has been now raised to two rupees per maund, exclusive of duties. It is closely monopolized by the Panjáb Government, and Runjít Singh hopes to derive an annual revenue of sixteen lacs of rupees, with $2\frac{1}{2}$ additional for the duties. A lac and a half of rupees however is expended in working the mineral. The profits amount to about 1100 per cent. though the salt is sold for one-third the price of that of Bengal, which averages 5 Rupees per maund of 80 lbs.* The Panjáb salt is exported by the *Jelum* to *Multan* and *Bhawalpúr*, where it meets that of the *Súmar* lake. It finds its way to the banks of the *Jumna* and to *Kashmír*, but it is not exported

* Vide Mr. Ramsay's Evidence before the Committee of the Lords.

westward of the Indus. Runjít Sinh has prohibited the manufacture of salt in all parts of his dominions, yet it is very questionable if he will ever derive so large a revenue from it as he now expects. The farmer of the monopoly, a cruel and tyrannical man, is now mercilessly oppressing the people to extract it. The natives do not know the period at which these mines were first worked, but it must have been at an early date, since the mineral is laid open by the Indus. They were used by the Emperors of Hindústán, but the inquiring Baber does not mention them in his Commentaries.

VI.—*Mode of extracting the Gold Dust from the Sand of the Ningthee River, on the frontier of Manipúr.*

[Extracted from Captain Grant's Letter to Mr. G. Swinton, dated Manipúr, 1st March, 1832.]

Read 4th April, 1832.

I forward a specimen of the gold found in the sand of the Ningthee river, and partly extracted in my presence. The process is very simple, as is also the apparatus employed; the latter consists of a plank four feet in length, two and a half wide at the upper end, and tapering towards the lower one, which is one and a half; it is hollowed out so as to leave an edge of half an inch round the sides and upper end, the under end being left open for the water to run off; the lower half of the plank is cut into a succession of grooves half an inch deep and the same in width. This plank is placed slightly sloping towards the lower end, and the sand washed through a coarse sieve which frees it from the pebbles and gravel: the fine sand which remains in the grooves of the plank is then placed in a wooden trencher, polished on the inside with *keoo**, and in shape and size resembling a shield, with a very small receptacle in the centre: this is immersed so as to leave its outer edge on a level with the surface of the water, and by a rotary motion, the fine sand is washed off and the gold remains in the small receptacle. The whole operation occupied about a quarter of an hour, and the quantity of gold found was about a grain troy weight. Gold is found in greater abundance at most other places, where searched for in the sands of the Ningthee, than at Helao, where I witnessed the process; it is also only found where the sand is mixed with pebbles and gravel: the black sand, which accompanies it, is invariably found with the gold; its appearance, in fact, denotes the pre-

* The black varnish of the *keoo* tree, which grows in the Rutboo valley, supposed by Dr. Wallich to be the same as the varnish tree of Ava. G. S.

sence of the latter. I also forward a specimen of an ore which is abundant in the bed of the Maglung ; being no mineralist, I will not venture to pronounce an opinion as to the nature of the metal it contains*. I inquired of the *kubas*, who could give me no information on the subject. I enjoyed a coal fire every evening during my progress up the Maylung ; it burned well, but the smell was somewhat strong ; there are quantities of it to be found in all parts of the bed of the nalá, the *kubas* say it is petrified teak charcoal : an opinion in which I am inclined to agree, as I saw immense logs of that timber, which were undergoing the change to petrification ; and parts which were partially burnt, were to all appearance the same as the coal. I have got specimens of the coal and petrified teak, but do not send them, having sent some four or five years ago, to Mr. Tucker ; I also perceived a notice on the subject by Dr. Richardson : should you wish it, I will send them on hearing from you. The *kubas* and *nagas* use the petrified teak for striking fire to tinder ; there is one peculiarity respecting its locality which struck me, it is that I have only observed it (in all places between Mulphoo and Sunayachil), at about the same distance from the Ningthee, that is, at the foot of the last range of the Augoching hills on their eastern side.

VII.—*Note on Indian Saline Deposits.* By the Reverend R. Everest.

[Read in the Phys. Cl. on the 4th April, 1832.]

Some months ago I had the honour of laying before the Society my views respecting the deposits of common salt in the soil of the *Bundelkhand* country, as mentioned by Capt. Franklin, and also those of the *Bhartpúr* district, as mentioned by an anonymous writer, in the *GLEANINGS*. I then ventured an opinion, that these deposits were not to be considered as characteristic of the new-red-sandstone, partly because their chemical composition differed from that of the rock-salt deposits in Europe : the *Bhartpúr* deposits being stated to consist of muriate, with some sulphate and carbonate of soda ; the rock-salt of Cheshire, on the other hand, being composed principally of muriate of soda, with some sulphate of lime ; and partly, because it was in no wise proved that these deposits were connected with the sandstone formation itself, further than by their existence in the superincumbent soil. I now beg to call your attention to the newly discovered saline deposit in the plain

* Iron pyrites.

about a mile to the west of this, as confirmatory of my previous opinion. The salt is principally composed of carbonate, with a mixture of sulphate and muriate of soda. It effloresces on the surface in the dry weather, and is scraped off by the natives. I had the soil opened above a foot in depth, and it appeared to be equally impregnated beneath.

This deposit is not connected with any sandstone, and is 35 miles distant from the nearest point of the great sandstone formation of *Bundelkhand*. From inquiries I have made, I am led to believe, that similar saline deposits are not unfrequent in this district. Capt. Franklin mentions salt in the valley of the Ganges beyond *Mirzapúr*, and the salt of the *Bhartpúr* district is not proved to be connected with the sandstone; therefore we have no reason to believe it peculiar to any formation. As the sulphate of soda is said to be collected in large quantities from the soil of the basaltic districts on the western side of India, it is not improbable that these saline deposits are distributed over the peninsula of India co-extensively with the nodules of *kankar* (carbonate of lime) and hydrated iron ore.

Ghazipur, March, 1832.

VIII.—*Smelting of Iron in the Kasya Hills.*

The following is the method pursued from time immemorial by the natives of this part of the country in working down the ores of iron so plentifully met with hereabouts.

There are large grass huts at least twenty-five feet high, the thatch of which reaches down to the ground on all sides. The interior, of an oval form, 15 by 30 feet, in the two diameters, is divided into three apartments; the central one being the smelting room.

Two large double bellows, with the nozzles pointed downwards, are set upon one side of the apartment, on the upper part of which a man stands with one foot on each, his back supported by two planks. He holds a stick in his left hand, which is suspended from the roof, and has two strings attached to it below, connected with the two bellows: these are worked quickly by a wriggling motion of the loins, and the strength of the leg.

The nozzles of the bellows unite in a tube which leads underground, from a sort of wind chest, to the hearth about four feet in front of them. Over the hearth is a chimney of pipe-clay braced with iron hoops, two feet in diameter at the bottom, and about six feet high. The mouth at bottom is on the side away from the bel-

lows, and the chimney inclined from them to direct the heated air from the smelter towards an opening in the roof. At the right side of the bellows and even with the top of the chimney, is a trough containing damp charcoal and iron-sand: at every motion of his body the operator with a long spoon tumbles a piece of this charcoal with the iron-sand adhering to it, down the funnel of the furnace, and when a mass of melted or rather softened iron is formed on the hearth, it is taken out with tongs, and beaten with a heavy wooden mallet on a large stone by way of anvil. The iron in this state is sent down to the plains for sale or barter. The smelters say that they procure their fire-clay in large quantities from the vicinity of the limestone hill at *Chirra Púnjǐ*, whence on a former occasion I sent you a series of geological specimens, among which, if I remember right, was some of this clay, of a light straw colour and slaty texture, containing minute micaceous particles.

W. C.

References to Plate VI.

1. The chimney of the furnace supported by stone pillars, so as not to touch the hearth.
2. One pair of bellows open.
3. Ditto shut.
4. Frame on which the man rests.
5. A primitive ladder for mounting the bellows.
6. The wooden mallet.
7. The tongs.
8. The spoon.
9. The trough supported by a wooden fork.

VII.—On Chinese Vermilion.

[Translated into French from a Chinese Technologic Encyclopedia, entitled, *Thian-houng Kaï-we*, or *Exposition of the Wonders of Nature and the Arts*. By M. Stanislas Julien*.] From the *Nouveau Journal Asiatique*.

Cinnabar, liquid silver, the red of silver, are in reality one and the same thing. What causes them to bear different names is that the substance is either pure or coarse, or old or recently extracted.

Cinnabar, of the first quality, comes from *Chinpé* (now *Mayang*), and from *Sitchouan*. It is found in a state of purity in the bosom of the earth, and does not require purification by fire. This *cinnabar*, which is used to polish the tips of arrows, metallic mirrors, &c. is thrice as valuable as mercury: whence it is carefully picked and sold under its native form, that is, in the state of sand or red powder. If melted, it loses a great part of its value.

* The Chinese edition whence this article is extracted bears the date of 1637.

The coarse cinnabar, of the second quality, needs to be purified by the fire, when it forms mercury.

The cinnabar of the first quality is found by digging the ground at a depth of 70 feet. The presence of the mineral is indicated by the appearance of small white granular stones. The largest pieces are of the size of an egg. The second sort does not enter into any pharmaceutic preparation. It is ground up and used by the painters and colorists in the same manner as that which is prepared directly from mercury. Its matrix does not always appear under the form of white stones, but has sometimes a mixture of blue and yellow. It is found about 20 feet below the other. Sometimes it is met with in a stratified sandy soil, and then the stony and sandy gangue is easily separated. This kind of cinnabar is found in abundance at *Koucitchou Ssein*, at *Thoung-jin*, &c. also in great quantities at *Changtcheou* and at *Tsintcheou*.

The cavities from which the second sort is collected, have a whitish aspect. When recently extracted, it may be separated without the necessity of previous pounding. This cinnabar, on first coming from the mine, has a brilliant surface, which soon tarnishes on contact with the air.

To prepare the vermilion, they take the cinnabar, and pound it in an iron mortar shaped like a boat, with a stone pestle of a flattened spherical form, and placed at the end of a vertical lever moved by four men, by means of a bar which passes through it. The powder is thrown into clean water, and left to soak for three days and three nights. One part falls to the bottom of the vessel, the other, lighter, floats on the surface: this is removed with a skimming ladle and placed in a second vessel. It is then called *Eult chou*, or *second red*. The cinnabar which was deposited in the first vessel, is taken out, dried in the sun, and is then called *Theout chou* or *first red*.

To obtain quicksilver from the ores, either the second quality, inferior cinnabar, white and newly extracted, or the deposit, or the skum separated on the surface of the water, are employed.

Thirty pounds of one of the above ores is put into an iron vessel, with a convex head of the same metal, having a small opening in its centre: the two are carefully luted together, and a curved iron tube fitted hermetically into the aperture at top, with hemp and luting.

Thirty pounds of charcoal are necessary for the distillation: when the retort becomes hot, one end of the iron tube is plunged into cold water, so that the vapour which rises from the metal pot distils over through the tube, and condenses in the water. In five hours the whole of the cinnabar is transformed into mercury, which is taken out of the water after having been suffered to repose for 24 hours.

Sometimes the mercury is treated afresh, to be converted into vermilion, which is then called *Intchou*, that is to say *red of quicksilver*. A retort of porcelain, or a double vessel of metal, are employed indifferently for this purpose: to one pound of mercury two pounds of sulphur are added; the mixture is triturated until it forms a blackish powder: it is then put into the crucible, which is covered with an iron cover, held down by a bar of iron laid across the top of it, and tied down on either side to the lower vessel by means of a loop of brass wire made fast round the latter. All the openings are then carefully closed with lute, and the pot is set upon an iron tripod, under which a fire of resinous faggots is maintained for a considerable time; whilst the cover is kept cool with an old swab soaked in water. The mercury then combines with the sulphur, and sublimes in a very fine powder, which adheres to the sides of the vessel. The cinnabar which fixes on the inside of the cover is of the brightest colour. When the vessel is quite cold, the vermilion is taken out. The excess of sulphur is found precipitated to the bottom, and may be employed a second time. One pound of mercury gives 14 ounces of cinnabar of the first quality, and $3\frac{1}{2}$ oz. of the second quality.

The cinnabar obtained by the action of fire, and that from the pulverized native ore, have exactly the same appearance; nevertheless the former is never used in painting the houses of princes and persons of distinction: the only sort employed for this purpose being the pure pulverized mineral from *Thoung chin* and *Pe-tchouan*.

When intended to be used in writing, the vermilion is ground up with gum and made into small cakes. Rubbed upon a stone palate (encrier,) it presents a red of the richest brilliancy: if pounded on a tin slab, it forms a black colour, and is then fit for the varnishers, and gives to objects a glistening tint which enhances their price. Mixed with the oil of the *Thoung* tree, it assumes a very bright appearance: but if varnish be added to this, it loses its brilliancy and becomes of a deep black colour.

Thus we have described faithfully all that concerns the preparation of native and artificial cinnabar, as well as that of mercury. All that has been said about *the sea of cinnabar* and *the vegetable cinnabar* rests on no foundation whatever: they are mere reveries fit to amuse the credulous and lovers of the marvellous.

When mercury has been converted into vermilion, it has no longer the power to return to its original state, because it has then arrived at what may be called *the final limit of transformation*.

X.—*Abstract of Meteorological Tables, kept at Bancoora, by Mr. J. MacRitchie, for 1830 and 1831.*

1830.

Months.	Ther. lowest 24 hours.	Ther. highest 24 hours.	Barometer. Noon.	Rain in inches.	Prevailing Winds.	Occasional observations.
January, ~~~	62.8	71.7	29.890		N. W.	
February, ~	ab	sent				
March, ~~~~	78.2	85.1	.678	03.80	N. W.	4 Foggy mornings. Hailstorm on 26th, stones 9. in. in circum. Total Eclipse of ☾.
April, ~~~~~	82	88.4	.610	2.370	S. W.	
May, ~~~~~	84	90.3	.479	5.627	W. N. W.	Very cloudy and rainy.
June, ~~~~~	85	89.8	.331	8.600	W.	Rains set in on the 6th, with severe thunder, lightning, and rain.
July, ~~~~~	34.5	9.2	.425	15.506	W.	
August, ~~~~	83.3	9.	4.62	6.908	S. E.	
September, ~	35.	9.2	5.00	4.784	N. W.	Total Eclipse of ☾ visible on 3rd.
October, ~~~~	83.	87.5	6.37	1.672	W.	Stormy 2 days.
November, ~	73.1	81.6	6.25	.963	N. W.	
December, ~	61.6	70.	89.5		N. W.	
Yearly aver.	78.5	84.7	29.592	46.804	N. W.	On surface generally variable.

1831.

January, ~~~	66.3	73.	29.871		W.	A distant Comet visible for 10 days.
February, ~				3.000		Partial Eclipse of moon on 26th.
March, ~~~~	73.5	79.9	.748	1.642	N. W.	
April, ~~~~~	83.1	88.1	.610	4.397	W.	
May, ~~~~~	87.	92.8	.510	0.300	W.	Very hot and dry generally.
June, ~~~~~	86.5	91.2	.370	15.989	N. W.	Rains set in heavily on the 9th.
July, ~~~~~	85.5	89.7	.385	10.987	W.	
August, ~~~~	85.	87.5	.345	11.286	S.	
September, ~	82.5	87.5	.538	10.259	E. S. E.	
October, ~~~~	81.2	87.2	.600	5.854	N. E.	Rains broke up on 31st, with a violent hurricane, for 12 hours,
November, ~	70.	78.	.685	4.460	N. W.	from 6 P. M. to 6 A. M. 1st Nov. Bar. ranged from 29.5 to 28.8.
December, ~	69.5	73.5	.810	1.438	N. W.	Torrents of rain. Trees torn up. Extraordinary cloudy and rainy month for the time of the year.
An. Mean,	79.1	84.4	29.588	69.652	W. N. W.	On surface generally variable.
Mean of 2 years, ~~~~~	78.8	84.5	29.590	58.228	W. N. W.	Range of Bar. from 29.920 to 28.800.

The Thermometer I observe by is a self-regulating one by Carey, and seems to answer the purpose very well. The Barometer is one of Bate's Marine ones. The rain-gauge is made by Knight.

XI.—MISCELLANEOUS NOTICES.

Extracts from a Native Receipt Book.

The following receipts may prove highly useful to such of your correspondents as are engaged in Indian field sports, and can appreciate the advantage of being their own *elephant doctors* when professional advice is not procurable; they are extracted from the nostrums of a first-rate Delhi mahout, and I have had an opportunity of trying most of them at different times in my sporting days, when I made a point of attending personally to the comforts and welfare of my noble sporting companion. Should these receipts prove useful to fill a vacant sheet occasionally, I shall be happy to continue the supply. W. L.

Medicines, &c. for Elephants.

1. When an elephant's back is swollen, and it is necessary to cut it to let out the matter, the wound is to be well cleansed with the following, previously to filling it with No. 2. Make an extract from the root of the madár, add thereto 1 chittak of salt and 1 cowrie weight of nílá tútía, to be removed every evening for about 8 days, to cleanse the inside well; then fill it with No. 2 for about 16 days, removed twice a day, at first for 8 days, and afterwards once in 8 days, and the upper part of the wound and swelling to be well anointed with the salve No. 2. No. 3 to be then sprinkled well over the wound twice a day.

2. Salve for the sore back.

Musabbar, [aloes.].....	4 chittaks
Sindúr Guzaratí, [red lead].....	2 ditto
Olive Oil.....	4 ditto
Chota jewarkíatta, [flower of barley].....	2 seers
Karwa tël, [mustard oil]....	1 seer
Nílá tútía, [blue vitriol].....	2 chittaks
Wax.....	2 ditto
Opium.....	1 cowrie wt.

3. To dry up the sore.

Nutmegs.....	2
Ilachís, (cardamums.).....	1 chittak
Dár-chíní, [cinnamon].....	1 ditto
Isafgol, [<i>Plantago</i>].....	1 chittack
Tukhm-Balangu, (<i>Dracosephalum Royleanum</i> .).....	1 ditto
Sang jaráhal, (alum?).....	1 ditto
Paprí kat, (white catechu.).....	1 ditto

To be finely powdered and sifted through fine cloth, and to be applied to the wound to dry it up.

4. Lotion for inflamed eyes, &c.

Rab-ul-sus or liquorice to be soaked in water in an earthen pot, and to be beaten to a strong froth with the hand, and as it subsides is to be taken up and thrown upon the elephant's eyes; this is very cooling.

5. Ditto another.

Poppy heads.....	4 chittaks
Dhania, [coriander seed].....	4 ditto
Sounph, [<i>anethum</i>].....	4 ditto
Nousádar, [sal ammoniac].....	4 ditto
Salt, Bherí, [black salt].....	4 ditto
Salt, Sámar.....	4 ditto

To be steeped in water for 4 days in the shade in an earthen vessel.

6. *Ointment for swollen and inflamed eyes.*

Sabzí, [hemp leaves.].....	4 chittaks
Phitkari, [alum.]	1 ditto
Opium.....	1 pysa bhar
Ounla, [myrobalan seed.].....	2 ditto

Roast the alum and rub it well up with the sabzí in a little water, then with the other ingredients apply all round the eye for 3 or 4 days.

7. *Powder for ditto.*

Bhímseñí Caphùr, [purified camphor.].....	1 tola
Fine sugar.....	1 tola

Powder and sift very fine together, then take a feather and introduce a little into the eye for 4 or 5 days, when the eyes are very much swollen and inflamed.

8. *For accidental bruises, or swollen back or feet from long journies, or hard work, or from exposure to cold or water.*

Nosádar, [sal ammoniac.].....	4 chittaks
Sámar salt.....	8 ditto.
Kárwa tel.....	1 seer.

To be finely powdered, and beat up with the oil, and applied to the part affected, at the same time to be fomented with cow-dung fuel (úplah).

9. *Cathartic for an Elephant when she eats earth, or shows other symptoms of a foul stomach.*

Musabbar Kamungarí, [aloes?]	12 chittaks
Chouk.....	12 ditto
Gandak balesnar, [sulphur.]	12 ditto
Híng, [assafœtida.]....	12 ditto
Old gur, [molasses.].....	1 seer.

To be made up into three balls, to be given at three different times. If however the elephant will not take this, give

No. 10. The roots of sarpat, 10 seers, to be made into an extract with water, make up 5 seers atta into cakes with $\frac{1}{2}$ seer of salt, and the above extract : having baked the cakes, make the elephant eat them.—Should this be too violent, give

No. 11. Rice, 5 seers, boiled, to which add 4 chittaks of dahye ; if not procurable, butter ; continue for a few days, after which the following cordial :

12. Shrab, [wine.].....	1 seer
Kátkí.....	4 chittaks
Gol mirich, [black pepper.].....	4 ditto
Anar ke chilka, [rind of the pomegranate.]..	4 ditto

To be boiled in water and then mixed with the shrab, and the cakes to be broken up and mixed with these ingredients.

13. *A salve for an Elephant's back when nearly healed up.*

Bara ním, (leaves of the.)	1 chittak
Chotah ním, (do.).....	1 ditto
Bylawe.....	2 ditto
Tutía, [blue vitriol.].....	1 pysa bhur

To be filled into the wound, and a piece of rag stuffed gently in.

(To be continued.)

XII.—*Proceedings of Societies.*

1.—ASIATIC SOCIETY—PHYSICAL CLASS.

Wednesday Evening, the 4th April, 1832.

The Honorable Sir Edward Ryan in the Chair.

1. Mr. Kyd presented some specimens of Barnacles of an unusual size, taken from a piece of timber found floating in the Bay of Bengal.

2. Mr. Calder presented, on the part of the *Société d'Histoire Naturelle de l'Ile Maurice*, copies of the proceedings of that Society, and of the Annual Reports delivered at the Anniversary Meetings of the 29th August, 1830—1831.

There seems to have existed so far back as 1801, a *Society of Emulation* at Port Louis, Mauritius, instituted by Messrs. Bory de St. Vincent and Lislet Geoffroy, and several other naturalists who remained in the isle on the occasion of Gabarres expedition. From time to time it published articles on Natural History and other branches of knowledge—it held its last meeting to greet the arrival of Freycinet in the French ship of discovery, *L'Uranie*, in 1818.

Under the French government, Genl. Decaen had intended to add a cabinet of Natural History, with a library and collection of instruments, to the Lyceum founded by him, but the project was, from some unknown cause, frustrated. Long previous to the thought of such an institution, however, most of the natural productions of the isle had been brought to the knowledge of the world through the labours of Aublet, Commerson, Sonnerat, Jossigny, the Viscount de Kerhoens, so often quoted by Buffon, and even the celebrated St. Pierre, to whom may be added De Cosigny, Beauvais, and Céré.

In 1826, two naturalists resident at Port Louis, in the most disinterested manner offered to contribute their own collections towards the formation of a Museum connected with the College; but circumstances changed with English rulers, and no answer even was deigned by Sir G. Lowry Cole, or Genl. Darling.

The present Society owes its origin entirely to the private exertions of Mr. C. Telfair, Mr. J. Desjardins, and their friends.—They first thought of calling it “the *Asiatic Society*,” and connecting its labours with those of Calcutta and London, but preference was at length given to the present designation of “the Natural History Society of the Mauritius.” It opened its meetings on the 24th August 1829, the anniversary of the birth of the Baron Cuvier, the most distinguished natural philosopher of the present age; and the same auspicious day was fixed for the subsequent annual festivals of the Society. Two of these have since elapsed, and on each occasion an able and copious analysis of the past year’s labours was read by the secretary Monsieur Desjardins. The present Governor Sir Charles Colville, at the earnest request of all the members, accepted the office of patron, and granted an apartment of the government house for the meetings of the Society. Reports of the proceedings of the Society will be published regularly in the Journal.

2. Read a letter from the Revd. R. Everest, addressed to the President, on the subject of the Indian sandstone, and describing the extraction of carbonate of soda and common salt from the soil in the neighbourhood of Ghazipur.

3. Read a note on the geology of Elephant Hill on the Quedah Coast, by Dr. Ward, Madras Medical Establishment, accompanied with specimens of the rock, communicated by Sir Charles Grey.

The country north of Quedah beach is an immense plain nearly level with the sea, and covered near the coast with mangrove, rising gently towards a small chain of hills to the east, 16 to 20 miles distant. The soil is a rich white

clay mixed with sand. From this plain, 6 miles inland, and quite insulated, rises abruptly the Elephant rock. The ground around it is a complete swamp, and the elephants in approaching were buried to the howdah in mud. The rock is a close grained limestone of a grey colour: it is penetrated by a number of caves of various dimensions: stalactites hang on the face of the rocks within and from the roof:—the floor is leveled by a stalagmitic incrustation, covering loose calcareous earth about 60 or 70 feet deep. In one of the caves, at an elevation of 8 or 10 feet above the surrounding plain, an insulated mass of shells was found; cockles, oysters, and a larger kind of muscle, connected together by calcareous matter: there was no appearance of shell strata in the rock.

The caves contain no sculpture. The natives assert that formerly the Elephant rock was surrounded by the sea.

4. A letter from Captain Grant, of Manipúr, communicated by G. Swinton, Esq. describing the process of extracting gold from the sand of the *Ningthee*; specimens of the gold dust and sand accompanied, and some crystallized pyrites. [This paper is inserted in the present number.]

5. Some account of the Lacquered or Japanned Ware of Ava, communicated by G. Swinton, Esq. on the part of Major H. Burney, Résident at Ava; illustrated by a complete series of specimens of the ware, as well as of the materials with which it is manufactured: also of the varnish and of the various metallic dyes used to colour it. [This will be published in our next.]

6. Description of a new species of *Buceros* of Nipál, the *Buceros Homrai*, by B. H. Hodgson, Esq., with remarks on its anatomical structure, by Dr. J. Bramley, and with an accurate drawing of the animal.

7. Account of the Salt Mines of the Panjáb, by Lient. S. Burnes, Bombay Army, enclosed in a letter from that officer, dated *Rawil Pindi, 10th March, 1832*, with specimens of the native ore of lead, sulphur, alum, and red clay, from the range in which the salt is found. [Published in the present number.]

The thanks of the Society were voted for the contributions of the evening.

2.—MEDICAL AND PHYSICAL SOCIETY.

7th April, 1832.

J. C. Boswell, Esq. Assistant Surgeon, at Penang, was elected a Member of the Society. The following communications were presented to the Meeting:

1. An Essay on *Lepa Tuberculata*, as it appears in Bengal, by Dr. T. A. Wise.
2. Remarks on *Variola* and some *Varioloid* Diseases, which have recently occurred subsequently to Vaccination, by H. S. Mercer, Esq.
3. An additional communication on *Dracunculus*, with cases, by Dr. Mylne.
4. Proces verbal of the Proceedings of the Society of Natural History of the Mauritius, at the Meetings of 25th October and 23rd November, 1831, transmitted by Monsieur Desjardins.

5. A case of *Lithontrity* Instruments, with a copy of Mr. Atkinson's printed letter, addressed to the Medical Board of Calcutta, describing the process of *Lithontrity*. A letter from the Secretary of the Medical Board, states, that should cases of *Urinary Calculus* occur in the practice of any of the medical men at the Presidency, these instruments will be available for their use.

6. At the same time, Dr. Casanova brought for inspection of the Society, a complete set of instruments, made precisely after the model of those used by Mons. Civiale, at Paris; together with that author's work on *Lithontrity*. Mons. Civiale's apparatus is peculiar in the lightness and firmness of its construction, and in having a spiral spring to regulate the pressure of the borer against the stone;

during the action of the drill ; so that the aid of an assistant to the operator is not required. Dr. Casanova stated to the Society, that he has now a case of Urinary Calculus, under treatment by Civiale's process, and he exhibited some portion of the stone which had been reduced to a powder by the first operation, on this subject. A chemical examination made by the President, proved this to be composed principally of carbonate of lime, with some phosphate of lime, and scarcely any lithic acid : a very slight trace of iron was apparent, probably from attrition of some particle of the Lithontriteur. Dr. Casanova also presented to the Society, the fragments of a stone on which he had successfully operated at the Mauritius ; and he offered his apparatus, made after Civiale's model, for the use of any of the professional men at the Presidency, who might require it either for operation, or to have a similar apparatus made here.

7. A letter from Mr. Royle, on his departure from Calcutta, presenting for the Library six medical works, viz.

Dionis's Surgery.

Le Dran's Surgery.

Lommius de Febribus.

Sennertus, Epitome Institut. Medicinæ, cum libro de Febribus.

Albertus Magnus de Morbis Mulier.

Michaeli's Scotus, Opusculum de Secretis Naturæ.

The following papers were then read and discussed by the Meeting :

The case of disease of the heart formerly presented by the Medical Board.

Dr. Casanova's case of Elephantiasis.

Mr. Mercer on Small-pox after vaccination.

This paper commences with a few remarks on the occasional occurrence of small-pox oftener than once in the same person ; the author then observes, that although the greatest benefits have been derived from vaccination, (the efficacy of which generally as a preventive of variola he fully acknowledges,) still it must be allowed, that sometimes a modified small-pox occurs after vaccination ; and in few very rare instances, the severer forms of confluent small-pox happen. Seven cases of variolous and varioloid disease have recently fallen under the author's observation, the particulars of which he now placed before the Society ; from consideration of these cases, he concludes, that the varioloid disease, after vaccination, occurs in a great variety of forms, and with considerable diversity in its eruptive symptoms, as well as in the degree of intensity of the attendant pyrexia. He is also inclined to believe, that some individuals who have been for a time protected against variola by vaccination, may become afterwards liable to suffer from the former disease ; although the present cases would not support a conclusion that there was any particular period at which the prophylactic property of vaccination ceased ; as the patients he has lately treated, while suffering from varioloid diseases, were aged respectively, 29, 28, 22, 20, 19, 13, and seven years ; they were vaccinated in infancy, and there is no evidence that any of them had in the interval been exposed to variolous contagion.

Mr. Hutchinson on the Proximate Cause of Cholera.

Mr. Hutchinson attempts to explain the mode in which the phenomena of that disease are produced. The idea of its depending on inflammation in the intestinal canal, (even were it shewn that an affection of that nature is invariably present, in the early stage of the disease, which it is not,) he considers totally inadequate to account for the phenomena. Mr. H. conceives Cholera to depend on a certain state of disorder of the functions of respiration, whereby the changes

essential to life, effected in that process, are influenced; perhaps principally the consumption of oxygen and evolution of carbonic acid gas. This state of disorder, Mr. H. considers to be the consequence of certain noxious changes, either in the electrical or gaseous constitution of the atmosphere; (most probably, by the former remotely, and the latter more directly;) by which the delicate nervous tissue of the lungs becomes impaired in its energies, and oxygen ceases to be consumed in the quantities essential to life.

3.—NATURAL HISTORY SOCIETY OF THE MAURITIUS.

Tuesday, 20th July, 1831.

M. Delisse, sen. communicated a letter received by him from M. Cailand, *Conservateur-adjoint* of the Museum of Natural History at Nantes, in which he proposed to effect a mutual exchange of objects with such of the members as might desire it.

The President read a letter from Sir Alexander Johnstone, to his excellency the Governor Sir Ch. Colville, dated London, 26th Feb. begging him to apprise the Society that H. R. H. the Duke of Sussex, now Pres. of the Royal Society of London, would extend his patronage to all scientific or literary Societies which might be formed at the Mauritius. The same letter mentioned the favorable reception of Professor Dabadie's observations on the comet of 1830, both by the Royal and by the Royal Asiatic Society, of which he had been elected an honorary member.

The Secretary was directed to acknowledge the honor of H. E.'s communication.

Mr. L. Bouton read an extract of a letter from Mr. Ad. Brongniart, inviting the aid of the Society in aiding the objects of the new school of arts and manufactures of Paris (where a new course of studies is recently opened,) by forwarding specimens of all substances employed in the domestic arts and manufactures of the island.

Mr. Lienard, sen. having proposed to write to the Governor, praying his support of the classes of physis, chemistry, and natural history, which had lately taken the place of the Botanical lectures at the Royal College,—Mr. Delisse, sen. read a work he had drawn up on the subject, which met with approbation from all the members present, and he was requested to undertake the drafting of the present address.

Mr. Bojer gave verbally the description of two birds of Agaléga, (male and female,) which he took to be the Ibis of the ancients: the specimens were from M. Delisse's collection.

The number of objects presented at this meeting was considerable.

A tiger skin, 12 feet long,—*by M. Wieké.*

A mummified head from New Zealand, of the chief Mallowolla, sent from Sydney by Captain Foreman,—*by Mr. C. Telfair.*

The rib of a woman which fell to his share in a feast among the cannibals of the same place,—*by Captain Briggs.*

Mr. Briggs saved and brought away a child of 7 or 8 years old, which was about to be sacrificed; its features are those of the Malgaches, or Creoles of the Isle of France.

The skins of two Maki, also some minerals and insects, with descriptions,—*by Mr. Cameron.*

Capt. Briggs, Mr. R. Campbell of Sydney, and Mr. S. Lair, of Paris, were elected honorary members.

XI.—Catalogue of Mammalia observed in the Dakhan. By Major W. H. Sykes.

[Reprinted from the Proceedings of the Zoological Society of London.]

Homo sapiens, L.—The people inhabiting the Dakhan have the Georgian form of skull; their stature is low; the colour of the skin brown, with shades running into yellow white in the higher classes, and black in the lower. The females are not distinguished for fertility, the average number of births to a marriage being less than in Europe. More males are born than females, and in nearly four millions of people I found the proportions of females to males to range in different districts from eighty to ninety females to one hundred males.

Semnopithecus Entellus, F. Cuv. *Mákar* of the Mahrattas.—This species is found in large troops in the woods of the Western Ghats. It is not venerated by the Mahratta people, nor do they object to its being killed.

SEMN.? ALBOGULARIS, Sykes. *Senn.*? *suprà flavo nigroque, infrà albo nigroque, irroratus*; *gula alba*; *artubus nigris*: *mistacibus latis aures penè obvelantibus*; *superciliorum pilis rigidis exstantibus*.

Hab. in Madagascar?

This species (a living individual of which is now in the garden of the Society) appears to be new to science. It is only provisionally classed as a *Semnopithecus*, pending our inability to examine its posterior molars. The animal was obtained at Bombay, where it was believed to have been taken from Madagascar; and as it has some characters in common with the *Cercopithecus* (especially with the group of which the *Cerc. Sabæus* forms a part) and the *Semnopithecus* of India, it may ultimately prove to be a connecting link between the African and Asiatic monkeys. It wants the long limbs of the *Semnopithecus*: and although its tail is very long, it is not particularly thin.

The following is the description of the animal—a male. Canines remarkably long (nearly $\frac{3}{4}$ of an inch), slender, sharp; incisors very short and even. Head rounded and short. Ears very small, nearly rounded, and for the most part concealed in the long hair about the head. Eyes deeply seated, and shaded by a continuous arch of long hairs directed forwards. *Irides* broad; of a brown ochre colour: hair forming a bunch on each cheek and resembling whiskers: no beard. Cheek pouches rudimentary only, not observable externally, even when filled, being concealed by the bushy hair of the cheeks. Thumbs of anterior hands short and distant; those of the posterior long. Whole of the upper surface of the animal of a mingled black and yellowish ochre colour, each hair being banded black and ochre; the black prevailing on the shoulders, the ochre on the back and flanks. Under surface grizzled white and black. Anterior limbs uniform black; posterior black, with a little of the dorsal colour. Chin and throat pure white. Tail black, half as long again as the body.

The manners of this monkey are grave and sedate. Its disposition is gentle but not affectionate: free from that capricious petulance and mischievous irascibility characteristic of so many of the African species, but yet resenting being teased, and evincing its resentment by very smart blows with its anterior hands. It never bit any person on board ship, but so seriously lacerated three monkeys, its fellow passengers, that two of them died from the wounds. It readily ate meat, and from choice would pick a bone even when plentifully supplied with vegetables and dried fruits.

Macacus radiatus, Geoff. *Wádnar* of the Mahrattas.—This well known species inhabits the woods of the Western Ghats in small troops. A female brought to England by me and presented to the Society, was capricious and mischievous in disposition, but of surprising courage and marked intelligence. It manifested considerable attachment to myself, which was less transient than I had anticipated, as it greeted me with evident demonstrations of joy on my visiting it in the gardens after the lapse of a month without seeing me. The natives of Western India educate this monkey to perform certain tricks.

Pteropus medius, Temm. *Warbagúl* of the Mahrattas.—This species is very numerous in Western India. Such variations are found in the colouring of different individuals in the same troop, that two or three species might be supposed to exist in it; but the great mass so closely resembles the *Pter. medius* of M. Temminck, that I do not consider myself justified in describing the *Rossette* of the Dakhan as a distinct species. The only persons in Western India who eat these *bats* are the native Portuguese, but I can personally testify that their flesh is delicate and

without any disagreeable flavour. I have measured individuals with a greater length of body ($14\frac{1}{2}$ inches) than is given to the *Pter. Javanicus* of Dr. Horsfield.

Nyctinomus plicatus, Geoff. (*Vespertilio plicatus*, Hamilton?)

This bat hears a very close resemblance to Dr. Horsfield's *Nyct. tenuis*.

RHINOLOPHUS DUKHUNENSIS, Sykes.—*Rhin. suprâ murinus, infrâ albidus brunneus; auribus capite longioribus: antibrachio corpus longitudine æquante.*

This bat belongs to the same section as Dr. Horsfield's *Rhin. insignis*, but differs from that species in being much smaller; in having the ears larger and more rounded; the nose-leaf with the upper lobe concave, ridged beneath and revolute above; and the front lobe oblong and notched in the centre. It differs from the *Rhin. crumeniferus*, Pér. and Le Sueur, (which is the *Rhin. marsupialis* of M. Geoffroy's lectures, and the *Rhin. Speoris* of M. Desmarest,) in being much smaller, this species having the fore arm nearly half as long again as the Dakhan bat. The upper nose-leaf also is much more produced, and finally the colour of the fur in this species is reddish. The fore arm of the *Rhin. Speoris* as figured, is 2 inches 2 lines long, and the body and head 2 inches 2 lines. In the Dakhan species the fore arm is only the length of the body. Expansion of its wings 10 inches.

Sorex Indicus, Geoff. *Cheechonlur* of the Mahrattas.—These troublesome and disagreeable animals are very numerous in the Dakhan, but much more so in Bombay. They do considerable damage in cellars by tainting the wine; and the passage of an individual over a vessel of water impregnates the whole mass with the scent of musk. I have had occasion to remark that the sebaceous glands in an old male were very large, and the odour of musk from them almost insupportable; while in an adult female the glands have been scarcely discoverable, and the scent of musk very faint. The Indian Shrew is as much carnivorous as insectivorous. Having killed the *Sorex Indicus* and *Sor. giganteus*, in the same room, and seen them frequently together, I look upon them as of the same species.

Ursus labiatus, Blainv. *Asuail* of the Mahrattas.—The system of dentition of this well-known animal appears to be anomalous; for instead of six incisors in each jaw, I have never seen more than four in the upper and six in the lower; the two centre teeth standing a little in front of the line of the rest. I have had opportunities of examining many skulls of animals of very different ages, and possess specimens at the present moment, all of which agree in the number and position of the incisor teeth. One of these individuals is so young that I do not conceive that the deficient incisors can have fallen out; nor is there any appearance of dentition having existed in the places which they should have occupied. It might be deemed advisable therefore to remove this animal from the genus *Ursus*.

An *Asuail* brought to me from the woods when quite young, and which lived some time in my possession, fed by choice almost exclusively upon roast mutton and fowl; rejecting all fruits and vegetables. It ate, however, steeped grain (*Cicer arietinum*), and was very fond of huttermilk. These animals when taken young are readily instructed.

Lutra Nuir, F. Cuv. *Jahl Mârjar* or *Water Cat* of the Mahrattas.—The *Otter* of Dakhan differs only from the *Nair* in wanting the white spots over the eyes, in having a white upper lip, and in being somewhat larger; discrepancies which do not justify its being separated as a species.

CANIS DAKHANENSIS, Sykes.—*Kolsan* of the Mahrattas.

Can. rufus, subtus pallidior: caudâ comasâ pendente: pupillâ rotundatâ.

This is the *Wild Dog* of the Dakhan, and differs from any wild species hitherto described. Its head is compressed and elongated; its nose, not very sharp. The eyes are oblique: the pupils round, irides light brown. The expression of the countenance that of a coarse ill-natured *Persian Greyhound*, without any resemblance to the *Jackal*, the *Fox*, or the *Wolf*, and in consequence essentially distinct from the *Canis Quao* or *Sumatrensis* of General Hardwicke. Ears long, erect, somewhat rounded at the top, without any replication of the *tragus*. Limbs remarkably large and strong in relation to the bulk of the animal; its size being intermediate between the *Wolf* and *Jackal*. Neck long. Body elongated. Between the eyes and nose, red brown: end of the tail blackish.

From the tip of the nose to the insertion of the tail, 33 inches in length: tail $8\frac{1}{2}$ inches. Height of the shoulders $16\frac{1}{2}$ inches.

These animals hunt in packs, and the specimen brought to me was found to have the stomach distended with the remains of a *nylgau*.

None of the *domesticated Dogs* of the Dakhan are common to Europe.

The first in strength and size is the *Brinjarl Dog*, somewhat resembling the *Persian Greyhound*, in possession of the Society, but much more powerful. It is employed by the erratic people, the Brinjaris, in protecting their herds and in hunting. Its strength enables it to pull down the largest animals of the chase. It is courageous and intelligent.

The *Pariah Dog* is referable to M. Cuvier's second section. These animals are very numerous; they are not individual property, and breed in the towns and villages unmolested. Many of these dogs hunt very well by scent.

Amongst the Pariahs is frequently found the *Turnspit Dog*, long backed, with short crooked legs.

There is also a petted minute variety of the *Pariah Dog*, usually of a white colour and with long silky hair, corresponding to a common *Lap-Dog* of Europe; this is taught to carry flambeaux and lanterns.

The last variety noticed is the *Dog* with hair so short as to appear naked like the *Canis Ægyptius*. It is known to Europeans by the name of the *Polygar Dog*.

CANIS PALLIPES, Sykes.—*Landgah* of the Mahrattas.

Can. sordide rufescenti albidus; dorso nigrescenti ferrugineoque vario; pedibus totis pallide ferrugineis; caudâ sublongâ pendente.

This is the *Wolf* of the Dakhan. Its head is elongated, and its muzzle acuminate: a groove exists between the nostrils. Eyes oblique: *irides* yellowish bright brown. Ears narrow, ovate, erect; small for the length of the head. Tail pendent, thin but bushy, extending below the *os calcis*. General colour of the fur a dirty reddish white or whitened brown. Along the back and tail very many of the hairs are tipped black, mixed with others tipped ferruginous. The tailends in a black tip. The inner surface of the limbs, the throat, breast, and belly, dirty white; legs pale. From the ears to the eyes reddish grey, with a great number of short black hairs intermixed; from the eyes to the nostrils, light ferruginous. The fur from the *occiput* to the insertion of the tail is two or three inches long, gradually shortening as it approaches the sides; hence all over the body very short and lying close.

The description is taken from two three-parts grown animals, which I had alive for a considerable time in my possession.

Length from tip of nose to insertion of tail 35 to 37 inches; of the tail 11 to 12 inches; the hair extending two inches beyond the measurement.

These animals are numerous in the open stony plains of the Dakhan; but are not met with in the woods of the Ghats.

Canis aureus, Linn. *Kholah* of the Mahrattas.—The *Jackal* of Dakhan appears to be identical with the *Lavantine* and *Persian Jackal*. They are numerous in the Dakhan, and are terrible depredators in the vineyards. They are easily domesticated when taken young. I had a very large wild male and a domesticated female in my possession at the same time. The odour of the wild animal was almost unbearable. That of the domesticated *Jackal* was scarcely perceptible.

CANIS KOKRI, Sykes.—*Kokri* of the Mahrattas.

Can. suprâ rufescenti-griscus, infrâ sordide albus; caudæ comosæ apice nigro; pedibus rufescentibus; pupillâ elongatâ.

The *Fox* of the Dakhan appears to be new to science, although it much resembles the descriptions of the *Corsac*. It is a very pretty animal, but much smaller than the *European Fox*. Head short; muzzle very sharp. Eyes oblique: *irides* nut-brown. Legs very slender. Tail trailing on the ground; very bushy. Along the back and on the forehead fawn-colour, with hair having a white ring near to its tip. Back, neck, between the eyes, along the sides and half way down the tail reddish grey, each hair being banded black and reddish white. All the legs reddish outside, reddish white inside.

Chin and throat dirty white. Along the belly reddish white. Ears externally, dark brown, and with the fur so short as to be scarcely discoverable. Edges of eyelids black. Muzzle red-brown.

Length 22 and 22½ inches: of the tail 11½ to 12 inches.

Vierra Indica, Geoff. (*Viv. Rasse*, Horsf.) *Jawâdî Mârjar*, or *Civet Cat* of the Mahrattas.—There are two varieties of this species of *Vierra* in the Dakhan; one inhabiting the woods along the Ghats; the other the country eastward of the Ghats. The animal of the Ghats exactly resembles a specimen now in the

Museum, and formerly in the Menagerie of the Society; the ground colour being much grayer, and the lines more distinctly broken into spots. The other variety resembles in its ferruginous tint the specimens of the *Rasse* presented to the Society by Major-General Hardwicke, but has the four black longitudinal lines or stripes on the sides of the neck more marked, and is considerably larger: two of my specimens from the Dakhan being $27\frac{1}{2}$ and $28\frac{1}{2}$ inches long.

The Dakhan variety exhales a very powerful odour of musk, and the organs for the secretion of this drug are of considerable size.

The specimen presented by me to the Society died on board ship; and some hundreds of capillary worms were found all over the body lying between the skin and the flesh.

Herpestes griseus, Desni. *Mangús* of the Mahrattas.—The *Mangús* of Dakhan is no doubt the *Herp. griseus* of M. Desmarest, but very considerably exceeds in size the published measurements of that species; my specimens measuring from $19\frac{3}{4}$ to $20\frac{1}{2}$ inches from the tip of the nose to the insertion of the tail, and the tail 15 to $16\frac{1}{2}$ inches. This animal is decidedly plantigrade. In movement it appears to slide along the ground, rather than trot or canter. It is believed by the Mahratta people to have a natural antipathy to serpents, and in its contests with them to be able to neutralize the poison from the bite of the serpent, by eating the root of a plant called *Mangús-wail*; but no one has ever seen the plant. Probably they allude to the *Ophiorkiza Mungos*.

Paradoxurus Typus, F. Cuv. *Úd* of the Mahrattas.—This animal, which is by no means rare in the Dakhan, is always lively, and a specimen in my possession was remarkable for the energy with which during the night time it chased round its cage. Its carnivorous propensities were so strong that it snapped off and devoured the heads of all fowls that incautiously approached its cage; but on board ship it was fed entirely on rice and clarified butter. In the stomachs of some individuals examined at Poona, I found fruit, vegetables, and *Blattæ*.

Hyæna vulgaris, Cuv. *Tarras* of the Mahrattas.—*Hyænas* are numerous in Dakhan. They are susceptible of the same domestication as a dog. The animal given by me to the Society was allowed to run about my house at Poona; and on board ship it was in the habit of gamboling like a dog. It allowed persons to put their hands into its mouth without attempting to bite ill-naturedly. It was fed on rice and clarified butter.

Felis Tigris, L. *Pattite Wagh* or *Striped Tiger* of the Mahrattas.—Royal tigers are so numerous in the province of Khandesh, that 1032 were killed from the years 1825 to 1829 inclusive, as appears by the official returns handed to me. They are much less numerous in the collectorates of Poona, Ahmednagar, and Dharwar.

Fel. Leopardus. *Chlta* of the Mahrattas.—This would appear to be the *Leopard* of Mr. Temminck's monograph of the genus *Felis*. It is a taller, longer, and slighter built animal than the succeeding, which I consider the *Panther*. It differs also in more of the ground colour being seen, and in the rose spots being much more broken; there are also other specific differences which the nature of this catalogue does not admit of my entering into. The natives of Dakhan consider the *Chlta* and succeeding Cat as distinct animals. The *Chlta* is rare. The *Panther* very abundant. I do not possess a specimen of the *Leopard*; the only one I was enabled to obtain having been given by me to the East India Company.

Fel. Pardus. *Bibla Bagh* of the Mahrattas.—This species is so abundant that 472 were killed from 1825 to 1829 inclusive, in the four collectorates of Dukhun. It exactly resembles the animal figured as the *Panther of the ancients* in Mr. Griffith's 'Translation of the Régne Animal.' It differs from the preceding in its smaller size, stouter make, darker ground colour, and in its crowded rose rings. The Society is in possession of several of these Cats; amongst others a half-grown animal from the Dakhan, which I presented to it in December last.

Fel. Jubata, L., and *Fel. venatica*, H. Smith. *Chlta* of the Mahrattas.—These presumed species appear to me to be identical, the specific differences deduced from the hair originating in domestication. I have a skin of the wild animal with a rough coat, in which the mane is marked, while domesticated animals from the same part of the country are destitute of a mane and have a smooth coat. They are led about like greyhounds; but when carried out to hunt are placed upon a cart.

Fel. Chaus, Guld. *Mota Rahn Manjur*, or *Larger Wild Cat* of the Mahrattas.—This species has a very extended geographical range, being found in Egypt, on the Caspian, in Persia, at Bangalore, and in the Dakhan. It frequents bushy moist situations. The only addition I can give to the published descriptions of it, is that the *irides* are of a bright reddish light yellow.

Fel. torquatus, F. Cuv. *Lhan Rahn Manjur*, or *Lesser Wild Cat* of the Mahrattas.—This animal is a pest, from the damage it does in poultry-yards in the Dakhan. It inhabits the grass roofs of houses, and thick hedges, and obscure places of our cantonments, shunning the face of man and the light, but is constantly on the alert at night. My specimens differ only from the *Fel. torquatus* figured in the third volume of the *Histoire Naturelle des Mammifères*, in the ears externally being tipped dark-brown, and in having two narrow stripes behind the eyes instead of one. The sexes resemble each other in colour, marks, and size.

Mus giganteus, Hardw. *Ghús* of the Mahrattas.—This is the well-known *Bandikút Rat*. In fully grown individuals, none of the teeth are tuberculous. Two specimens in my possession exceed in size any yet described, measuring respectively $16\frac{7}{8}$ inches, and $14\frac{5}{8}$ inches on the body. Tail $11\frac{5}{8}$ and $11\frac{7}{8}$ inches.

Unlike the common Rat, these animals seem to be entirely granivorous. They burrow under walls, and make such considerable excavations as to injure the foundations of buildings.

Mus decumanus, Pall. *Chúa* of the Mahrattas.—This species, the well known Norway or Brown Rat, abounds in Dukhun. It has been seen to migrate in thousands, destroying the crops in its march.

Mus Musculus, L.—This mouse is comparatively rare in the Dakhan.

Mus ———. Bright light chesnut above, reddish white below. Tail much longer than the body: size of the common mouse. Found only in fields and gardens. I believe this species to be new, but until I can recover the specimens which I brought to England, I refrain from naming it.

SCIURUS ELPHINSTONII, Sykes.—*Shekrú* of the Mahrattas.

Sc. supra nitidè castaneus, infra rufescenti-albidus; caudæ dimidio apicali pallidè rufescente.

This very beautiful animal is found only in the lofty and dense woods of the Western Gbats, and has rarely been seen by Europeans in the Dakhan. It is of the size of the *Sc. maximus*, and the general arrangement of its colours is the same; and as the *Sc. maximus* passes through some gradations of colour, the *Sc. Elphinstonii* might be supposed by casual observers to be a variety of that species. I am enabled to state, however, from personal observation, that the latter does not change its colour at any period of its life; specimens being in my possession of the most tender and mature ages.

Ears and whole upper surface of the body, half way down the tail, outside of the hind legs and half way down the fore legs outside, of a uniform, rich reddish chesnut. The whole under surface of the body, from the chin to the vent, inside of limbs, and lower part of fore legs, crown of the head, cheeks and lower half of tail, of a fine reddish white, the two colours being separated by a defined line and not merging into each other. Feet of a light red. Forehead and down to the nose reddish brown, with white hairs intermixed. *Irides* nut-brown. Ears tufted. Length of a male in my possession from the tip of the nose to the insertion of the tail 20 inches. Length of tail $15\frac{1}{2}$ inches.

The cry of this animal is *Chúk, chúk, chúk*; at first uttered slowly and then rapidly, and it is so loud as to have a startling effect.

I have dedicated this *Squirrel* to a very distinguished person and a zealous promoter of scientific research, the Hon. Mountstuart Elphinstone.

Sc. Palmarum, Briss. *Kharri* of the Mahrattas.—This well-known *Squirrel* is so abundant in gardens in the Dakhan that I have repeatedly caught two or three at once by simply planting out under a tree, a common wire rat-trap, baited with a little flour. Nothing can be more light and elegant than the movements of these little creatures. I have witnessed some singular instances of affection for their young in this species, which my limits do not permit me to detail.

HYSTRIX LEUCURUS, Sykes.—*Sayal* of the Mahrattas.

Hyst. caudá albá.

This animal appears to be distinct from the European species, which it closely resembles in form and covering. It is nearly a third larger. All the spines and tubes of the tail are entirely white, which is not the case in the *Hyst. cristata*. The

spines of the crest also are so long as to reach to the insertion of the tail. The ears are much less rounded, and the nails are shorter, infinitely deeper and more compressed, and with deep channels below. The white gular band is more marked; and, finally, the Asiatic species is totally destitute of hair, spines where wanting being replaced by strong bristles even down to the nails.

This species is abundant in the Dakhan and is very good eating. Like the African *Porcupine*, when alarmed or irritated it shakes the tuhes and spines of its tail violently, producing a startling noise. It stamps also with great energy with its hind feet; and when it assails an adversary it runs obliquely backwards, transfixing the foe with its spines.

Lepus nigricollis, F. Cuv. *Sassah* of the Mahrattas.—This species of *Hare* is so common in the stony and bushy hills of the Dakhan that I have had nearly a dozen brought to me, in the course of a few hours, by two or three men using nets called waggurs.

Manis crassicaudata, Griff. *Kuwli Manjur*, or *Tiled Cat* of the Mahrattas.—This species is very common in the Dakhan. They are incapable of climbing trees, and invariably move with the foreclaws doubled under the feet, so that they appear to walk on their knuckles. They live on white ants, and lap water like a dog; and like a dog also they are infested by the large blue tick. Their only defence is in coiling themselves up, and so strong is the muscular power of the tail, that I have had two men attempt in vain to unroll an animal.

Sus Scrofa, L. *Duhar* of the Mahrattas.—*Wild Hogs* abound in the Dakhan, and the males attain to a very great size. I am not satisfied that there is any specific difference between the European and Asiatic *Wild Hog*. Every village abounds with *Hogs*, but any property in them is equally abjured by individuals and the community. They live in the streets, are the public scavengers, and dispute with the *Pariah Dogs* the possession of offal matters thrown out from the houses. They are certainly of the same species as the *Wild Hog*. The flesh of the latter is eaten by almost all castes of Hindús excepting the Brahmins and Banias; but the flesh of the village *Hog* is not even touched by the carrion-devouring outcasts the Mahr. The *village Hog* is of the same colour as the wild animal, mostly a rusty black, and the only variations are slate black or slate intense brown; but it is not above two-thirds of the size of the latter. Tail never curled or spirally twisted.

Equus Caballus, L. *Ghora* of the Mahrattas.—A fine breed of *Horses* exists on the banks of the Bina and Mann rivers in the Dakhan, supposed to have been improved by the Arabian blood. I have been assured by a Brahmin that as much as 10,000 rupees (1,000*l.*) has been paid by a native chief for an animal of this breed.

The variety of the horse called *Pony* by us, and *Tattoo* by the Mahrattas, is sedulously propagated in the Dakhan, on account of its great use in the transport of baggage. The *Tattoo* is remarkable for its vicious propensities.

Equus Asinus, L. *Gadha* of the Mahrattas.—The *Ass* of the Dakhan is very little larger than a good mastiff or Newfoundland dog, but I have not remarked any other difference between it and the ass of England. Wild asses do not exist there, but they are said to be found in Katiwar.

Camelus Dromedarius, L. *Unt* of the Mahrattas.—The *Dromedary* is rarely bred in the Dakhan, but is in very general use; indeed armies in India could scarcely move without its aid. The two-humped *Camel* is not known.

Moschus Meminna, Erxl. *Pisoreh* of the Mahrattas.—This beautiful little animal is found in considerable numbers in the dense woods of the Western Ghats, but never on the plains. It readily reconciles itself to confinement, and a friend of mine had a pair that bred yearly. Its *irides* are of a deep brown. The flesh is excellent eating.

Carvus equinus, Cuv. *Sambur* of the Mahrattas.—This animal, which abounds in the Ghats of the Dakhan and in Khandesh, is no doubt the same as the Malayan *Rusa* figured in Griffith's 'Translation of the Régne Animal.' It wants the size of the *Cerv. Aristotelis* of Bengal, also called *Sambur* (not *Sambu*), and is not so dark in colour.

Cerv. Mantjak, Zimm. *Baiker* of the Mahrattas.—This beautiful species of *Deer* is a native of the Western Ghats of the Dakhan, and is never seen on the plains. An examination of the animal now in the Society's gardens will afford satisfactory evidence that those who have hitherto figured the animal, in works on Natural History, have been unhappy in not representing its true character. It always runs with

its head down and back arched. It is supplied with large suborbital sinuses, which it uses in the manner of the *Ant. Cervicapra*.

Antelope Cervicapra, Pall. *Bahmani* Horn of the Mahrattas.—This animal abounds on the plains of the Dakhan in flocks of scores, but is not met with in the Ghats. The suborbital sinuses are capable of great dilatation, and the animal applies them to objects as if for the purpose of smelling.

ANT. BENNETTII, Sykes. *Ant. cornubus nigris, lyrtis, apicibus lævibus leviter introrsum antrorsumque versis, ad basin ultra medium annulatis (annulis 8-9); rufescenti-brunneus, infra albus, jasciâ laterali haud conspicuâ; fuscâ mediâ strigâque ab angulo oculi ad oris angulum extensâ nigris; caudâ nigrâ.*

Kalsipi or *Black Tail* of the Mahrattas. Goat *Antelope* of Europeans.

This *Antelope* is found on the rocky hills of the Dakhan, rarely exceeding three or four in a group, and very frequently solitary. It belongs to the same section as the *Ant. Dorcas*. Horns erect, slightly diverging from each other, bending slightly backwards, at first subsequently with their joints bending forward. Ringed for $\frac{2}{3}$ of their length. The whole upper surface and outside of the limbs rufous or red brown. Under surface and inside of the limbs white. Tail black. A black patch on the nose. A black narrow streak from the anterior corner of each eye towards the angle of the mouth. Suborbital sinuses very small; in dried skins not observable; nor does the animal dilate them unless very much alarmed. Limbs long and slender; black tufts at the knees. Body light. The female has horns, but they are slender, cylindrical, and without rings. The buttocks present a heart-shaped patch of white. Unlike the *Ant. Cervicapra* it carries its tail erect when in rapid motion. It stands as high as the *Bahmani* Horn, but has less bulk.

Ant. ———. Brown *Antelope*.

I possess the skin of a three-parts grown *Antelope*, a native of the Dakhan, which lived for some months in my possession, but which its immature age prevents me from identifying. It had much the air of the *Ant. rufescens* and *Ant. silvicultrix*. It promised to have been a stouter animal than the *Ant. Bennettii*. Its habits were quite different, and it was remarkable for the impunity with which it fed, like a goat, upon the poisonous *Euphorbia Tirucalli*. The whole animal was brown above, whitened brown below. Horns cylindrical, pointed, without rings.

Capra. Hircus, Linn. *Bahi* of the Mahrattas.

The *goats* in the Dakhan are gaunt, stand high on their legs, have the sides much compressed, and are covered with long shaggy hair, which in most is black. Ears nearly pendent. *Irides* ochrey yellow or reddish yellow. Tail always carried erect in movement.

Ovis Aries, Linn.—*Sheep* are most extensively bred in the Dakhan, and as many as 20,000 or 30,000 sheep and goats may be seen together in the uncultivated tracts. The Dakhan variety has short legs, short thickish body, and arched chaffron. The wool is short, crisp, and coarse, and in nine out of ten sheep is black. Coarse blankets only are made of the wool. In most sheep there is a white streak or line from the anterior angle of each eye towards the mouth, and a white patch on the crown of the head. Away from our cantonments sheep are bought at 2s. per head.

Ant. picta, Pall. *Damalis risea*, H. Smite. *Rûi* of the Mahrattas. *Nylgâi* of the Persians.

This animal is an inhabitant of the Western Ghats of the Dakhan. The female is of a much redder slate hue than the male, and the young are absolutely rufous, changing and deepening to gray-slate with age.

Bos. Taurus, var. *Indicus*. (*Bos. Indicus*, Linn.) *Pohl* and *Byl* of the Mahrattas.

This animal, remarkable for its hump, is when early training to labour or to carriage nearly destitute of it. The *Brahmani Bull*, of which the Society has a fine specimen, in its free state, is scarcely able to move from obesity; but employed in the yoke or in carrying loads it would hardly be recognized as belonging to the same race. Park cattle are most extensively bred by the singular erratic people, the Brinjaris, and an army rarely moves in the field without 15,000 or 20,000 bullocks to carry its grain. Dwarf cattle are not met with in the Dakhan.

Bos. Bubalus, Br. Male called *Toudgah*; Female, *Mahis* of the Mahrattas.

The *Buffaloe* of the Dakhan, which is the long-horned variety, is mostly bred in the Mawals or hilly tracts along the Ghats. In those tracts much rice is planted, and the male *Buffaloe* from his superior hardihood is much better suited to resist the effects of the heavy rains, and the splashy cultivation of rice than the bullock. The female is also infinitely more valuable than the cow, from the very much greater quantity of milk she yields.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of April, 1832.

Days of the Month.	Minimum Temperature observed at sunrise.				Maximum Pressure observed at 9h. 50m.				Max. Temp. and Dryness observed at 2h. 40m.				Minimum Pressure observed at 4h. 0m.				Observations made at sunset.				Observations at 10½ P. M. in Calcutta.				Rain Gauges.			
	Barometre-ter reduced to 32°.	Temper. of the air.	Depres. of the air.	Wind.	Aspect of the sky.	Barometre.	Temper. of the air.	Depres. of M.B. Ther.	Wind.	Aspect of the sky.	Barometre.	Temper. reduced to 32°.	Depres. of the air.	Wind.	Aspect of the sky.	Barometre.	Temper. reduced to 32°.	Depres. of the air.	Wind.	Aspect of the sky.	Barometre.	Temper. reduced to 32°.	Depres. of the air.	Wind.	Aspect of the sky.	Rain No. 1.	Rain No. 2.	
1	29,876	71,5	1,	cm.	cl.	935	83,	6,4	s.	cu.	887	87,	85,3	12,1	cu.	883	82,	9,8	s.	cl.	9,6	77,0	5,0	s.	cu.			
2	88,0	74,1	1,8	s.	do.	939	85,	6,6	s.	ci.	850	90,3	13,8	9,3	do.	843	86,5	9,3	s.	do.	ci.	849	76,4	4,4	s.	cu.		
3	86,4	74,3	1,6	s.	cu.	917	81,5	7,	s.	cl.	881	86,8	13,6	11,8	do.	823	82,7	8,6	s.	do.	n.	849	78,2	5,2	s.	cu.		
4	78,0	76,3	2,8	s.	do.	862	85,7	8,5	s.	cl.	688	91,8	11,3	9,9	do.	681	89,7	9,9	s.	cl.	do.	735	79,3	5,3	s.	cu.		
5	75,6	78,	2,8	s.	do.	78	87,5	8,	s.	do.	631	94,	12,1	11,8	do.	615	92,3	11,8	s.	do.	do.	711	82,0	2,8	s.	cl.		
6	65,0	78,	2,1	s. w.	do.	714	89,3	10,1	s. e.	cus.	663	89,5	12,7	11,5	do.	614	88,	11,5	s.	do.	ci.	722	80,0	5,0	s.	cl.		
7	65,0	75,7	3,8	s. e.	cl.	784	80,7	9,2	cm.	ci.	605	86,3	13,1	11,9	s. w.	632	82,5	9,6	s. w.	do.	do.	783	79,1	8,3	var.	do.		
8	74,8	70,3	2,6	cm.	cl.	824	82,	10,3	s. w.	cl.	699	94,8	20,9	19,8	s. e.	692	86,	11,8	s. e.	cl.	do.	877	79,2	3,4	cm.	do.		
9	79,2	73,	1,5	cm.	cl.	870	86,5	10,3	s. w.	cl.	775	97,	18,	17,9	s. e.	826	88,3	12,8	do.	cl.	do.	802	80,5	5,7	cm.	cl.		
10	86,6	74,5	1,3	cm.	ci.	897	86,3	13,8	s. w.	cl.	806	91,	17,3	17,3	s. w.	761	87,3	15,6	s. e.	do.	do.	818	79,0	4,8	s.	cl.		
11	82,9	73,5	4,8	cm.	ci.	877	87,	10,1	s.	do.	730	9,5	27,	14,8	s. e.	730	88,3	14,8	s.	do.	do.	853	80,2	3,3	s.	ni.		
12	81,4	74,3	1,8	cm.	cl.	861	87,	10,1	s.	do.	752	95,	17,8	13,4	s. e.	641	86,7	8,	s.	do.	do.	817	78,9	3,0	s.	ci.		
13	81,5	75,5	1,8	cm.	cl.	853	86,3	8,4	s.	do.	658	96,5	17,3	13,4	s. e.	641	86,7	8,	s.	do.	do.	716	80,0	2,8	s.	ci.		
14	74,2	77,5	3,3	s. w.	do.	776	87,8	10,3	s. e.	cl.	652	93,	14,4	13,1	s. e.	664	85,7	6,5	s. e.	do.	do.	742	79,9	2,1	s.	ci.		
15	68,9	77,	2,8	s.	do.	779	87,5	8,3	s.	cl.	691	91,5	11,5	10,3	s. w.	662	89,3	9,8	s. w.	do.	do.	746	80,7	2,3	s.	n.		
16	71,9	78,	2,3	s.	cu.	779	85,	8,3	s. w.	do.	694	88,7	11,2	9,6	s. e.	702	83,3	9,6	s. e.	do.	do.	786	80,8	4,8	s.	n.		
17	70,7	78,3	3,1	s.	ci.	777	87,	9,3	s. w.	do.	723	89,7	11,5	10,3	s. e.	718	84,7	6,8	s. e.	do.	do.	844	79,5	7,5	s.	rn.		
18	741	78,3	3,3	s. e.	ci.	868	82,3	4,8	s. e.	do.	720	91,3	12,8	12,1	s. w.	770	82,5	8,3	s.	do.	do.	840	79,2	3,6	s.	ci.		
19	77,4	74,	4,5	s. e.	cl.	841	83,8	7,1	s.	do.	729	91,3	12,8	12,1	s. w.	747	81,5	12,6	n. e.	do.	do.	749	76,2	6,7	s.	rn.		
20	81,2	75,7	2,	n. w.	do.	800	83,5	6,5	s.	do.	662	83,3	14,4	12,1	s. e.	709	90,	12,1	s.	do.	do.	740	75,8	7,4	s.	n.		
21	78,8	70,	2,3	n. e.	cl.	764	86,5	8,	s.	do.	669	86,3	12,1	9,3	s. e.	673	82,	6,1	e.	cl.	do.	740	76,5	8,8	cm.	n.		
22	72,5	69,	2,8	n. e.	cl.	769	81,5	6,	s.	do.	645	90,5	9,6	8,3	s.	675	84,	5,8	e.	do.	do.	776	79,8	2,6	cm.	ci.		
23	76,1	71,	3,3	n. e.	ci.	791	80,	10,3	s.	do.	681	88,	8,3	10,6	s. e.	675	84,5	9,6	s. e.	do.	do.	734	76,4	7,4	s.	rn.		
24	70,3	71,7	3,3	s.	do.	821	85,7	8,2	n. e.	do.	672	91,3	12,5	10,6	s. e.	675	83,7	6,5	s.	cl.	do.	773	79,8	3,0	s.	cl.		
25	72,5	75,	2,3	s.	do.	783	86,5	11,6	s.	cl.	723	90,8	14,1	11,8	s.	671	84,5	9,6	s. e.	ci.	do.	773	79,8	3,0	s.	cl.		
26	71,6	74,5	2,3	cm.	do.	761	86,7	7,5	s.	ci.	677	93,5	15,1	11,8	s.	671	88,5	11,8	s.	cl.	do.	756	80,0	1,8	s.	cl.		
27	70,6	78,	1,5	cm.	cu.	747	86,	8,8	s.	do.	669	80,3	7,8	n. e.	cus.	669	80,	3	n. e.	do.	do.	727	76,2	3,4	s.	cu.		
28	68,3	76,3	2,4	s.	cl.	767	88,7	9,2	s.	do.	639	53,3	12,1	11,8	s. e.	639	80,	6,5	e.	ci.	do.	792	78,7	3,9	n.w.	rn.		
29	75,2	78,	1,8	s. e.	do.	785	86,7	9,2	s.	do.	684	93,3	12,1	11,8	s. e.	681	85,7	7,	do.	do.	do.	776	75,8	2,8	w.	cl.		
30	74,2	74,5	2,3	cm.	cu.	796	82,7	5,	n. e.	do.	646	91,7	11,2	9,3	s. e.	650	84,	6,3	do.	do.	do.	774	80,8	1,8	s.	cl.		
Mean	29,760	74,9	2,5			814	85,4	8,6			720	92,2	14,3	12,9		702	90,7	12,9				760	78,6	4,2				

Abbreviations. In the column "wind," small letters have been used instead of capitals; *cm*: means calm. In the column "aspect of the sky," *cy*: is cloudy; *cl*: clear; *rn*: rain; *ci*: cirrus; *cu*: cumulus; *cs*: cirro-stratus; *cus*: cumulo-stratus; *cc*: cirro-cumulus; *n*: nimbus.





